This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 427247 DUPL

GENERAL LIBRARY of the
UNIVERSITY OF MICHIGAN

PRESENTED BY

Office of State Engineer
& Surveyor, N.Y. 5/27/04

Transferred to the
GENERAL LIBRARY

TA
24
.N7
A2

ANNUAL REPORT

OF THE

STATE ENGINEER AND SURVEYOR

125878

OF THE

STATE OF NEW YORK

FOR THE

Fiscal Year Ending September 30, 1892.

TRANSMITTED TO THE LEGISLATURE JANUARY 18, 1893.

ALBANY:
JAMES B. LYON, STATE PRINTER.
1893.

STATE OF NEW YORK.

No. 35.

IN ASSEMBLY,

JANUARY 18, 1893.

ANNUAL REPORT

OF THE

STATE ENGINEER AND SURVEYOR.

OFFICE OF THE STATE ENGINEER AND SURVEYOR,
January 18, 1893.

To the Honorable the Speaker of the Assembly:

SIR.— I have the honor to transmit herewith my annual report for the fiscal year ending September 30, 1892.

Yours very respectfully.

MARTIN SCHENCK,
State Engineer and Surveyor.

REPORT.

Office of the State Engineer and Surveyor,
January 18, 1893.

To the Honorable the Legislature of the State of New York:

The State Engineer and Surveyor has the honor to submit herewith his report for the fiscal year ending September 30, 1892.

To this department is confided by the provision of the Constitution, the Revised Statutes, and laws passed at each session of the Legislature, supervision over the varied engineering operations connected with the public works of this State, chief among which are those relating to its canal interests, and it is to these interests that I would most especially call your attention.

The early history of the canals is a matter of public record, and information concerning the same is so widely diffused that it is not necessary that I should now enter into a recapitulation thereof. Suffice it to say that the policy entered into by our forefathers, by which the waters of Lakes Erie and Champlain were connected with those of the Hudson river, has to a very large degree contributed to the happy financial, commercial and industrial condition in which we now find ourselves; and that the question which now presents itself to your careful consideration, as to whether the full benefits of this policy have been already reaped, and therefore the great inland waterways of the State should be allowed to pass into a condition of inefficiency and consequent disuse, or whether by the exercise of such a fostering care of its property as the State in its present financial condition can afford, we shall adopt such legislation as will secure the maintenance of its present usefulness and also gradually obtain such improvements as the requirements of the age demand, is one of great moment. I believe that a large majority of our fellow citizens are in favor of a proper maintenance and a well devised scheme of improvement of our present canal system. Subsequent to the completion of the "Erie canal enlargement" and prior to the year 1876, the conduct of public works on the canal became the subject of serious criticism, the result of which was what is known as the Tilden investigation with its consequent purification of methods relating to the conduct of canal improvement and a temporary suspension of all State expenditures for canal purposes, except those necessary to provide for the operation of the canals in their then existing condition. Subsequent to the year 1876 and prior to the year 1884 (during which period the policy of free canals was adopted) no laws were enacted (save those reappropriating unexpended balances for the Champlain canal improvement) authorizing canal improvements on an extended scale. The Legislature of 1884, however, realizing that the then condition of the Erie canal was not such as to meet its requirements, enacted into law, chapter No. 80, Laws of 1880, providing for the lengthening of lock No. 50 and appropriating $30,000 therefor. The result of this experiment was so satisfactory that the Legislature of 1886 passed a law appropriating $200,000 "for facilitating State commerce by increasing the lockage capacity of the Erie and Oswego canals," thus again resuming the policy of canal improvements. Subsequent Legislatures have continued the active prosecution of this policy by adopting acts "for facilitating State commerce by increasing the lockage capacity of the Erie and Oswego canals and improving the Erie, Oswego, Black River, Champlain and Cayuga and Seneca canals," appropriating in 1887, $550,000; in 1888, $570,000; in 1889, $617,450; in 1890, $500,000; making a total of $2,437,450, besides making other appropriations during the years above mentioned for improving Buffalo harbor, rebuilding bridges and other structures, making sanitary improvements on abandoned canals, digging ditches, building walls, dams and culverts, deepening Oak Orchard creek, etc., etc., aggregating in 1886, $114,500; in 1887, $127,200; in 1888, $234,300; in 1889, $352,500; in 1890, $117,500; making a total for five years of $946,000.

In 1891, owing to a political dead-lock which occurred during the latter part of the legislative session, no general bill for increasing lockage capacity and improving the canals was passed, though bills for special improvements aggregating $179,900 were enacted into law, and in 1892 the canal improvement bill met with Executive veto, based not upon objection to the bill as a whole, but to some of the items contained therein; and in consequence of the form in which the bill reached him the Governor was obliged either to veto the whole bill or to approve of the objectionable items. Separate bills for canal improvements were, however, passed at this session of the Legislature, aggregating $174,900.

I do not believe that the failure of the last two Legislatures to pass the usual canal improvement bills can rightly be construed as an intention on their part to abandon the policy on this subject which had been satisfactorily pursued by their predecessors since 1886; nor do I believe that there is any general public demand for its abandonment. On the contrary, every convention of the two great political parties of the State held since 1886 has indorsed the policy of improving the State waterways and demanded its continuance, and the various organizations of business men residing in the large cities of the State have, with remarkable unanimity, indorsed this demand. I am aware that there is some sentiment existing among the rural portion of our population adverse to the making of large expenditures for the maintenance and improvement of our canal system, and the views of these gentlemen should be given due consideration, but in arriving at a conclusion as to the proper course to be taken, we should apply that sound political principle of doing "the greatest good to the greatest number" of our citizens, and if it be a fact that our State owes much of its present supremacy to its canals (unless it can be proven that they have to-day lost their usefulness), such wise expenditures should be made as will secure not only their maintenance in their present condition, but a gradual enlargement and improvement thereof. In making the detailed recommendations which follow, I have attempted to make the necessary application of the above conclusions. I cannot refrain from expressing my gratification at the results that have been obtained as a consequence of appropriations made for extraordinary canal improvements since 1886. I think it may be confidently stated that under the contract system which has obtained in doing the larger portion of this work (surrounded as it is by the many checks and safeguards which the statutes and the practices of the State officers charged with the execution of the work have provided) not only has the State received a full return for the money expended, but the work has been executed at a less cost than that paid by other corporations for the same character of work. The exhaustive testimony taken on this subject by the canal investigating committee of 1891 fully bears me out in this assertion and establishes not only the wisdom of the system now in vogue, but also the capacity and integrity with which the work has been conducted. In order to reap continued benefits from this system, I would recommend that all laws authorizing extraordinary improvements on the canals should contain a provision requiring the preparation and approval of plans and specifications by the State Engineer, and that they shall further require that all work authorized shall be done under the contract system unless the Superintendent of Public Works and the State Engineer and Surveyor jointly certify that the interests of the State would be best subserved by adopting other means.

ENLARGEMENT AND IMPROVEMENT OF CANAL PRISMS.

The extraordinary improvement laws from 1888 to 1891, heretofore referred to, besides providing for lock lengthening authorized the removal of silt from the bottom of the Erie canal so as to obtain a standard depth of seven feet, and also various other improvements on the lateral canals. The laws of 1888, 1889 and 1890 each appropriated the sum of $100,000 for the bottoming of the Erie canal, and much good has been accomplished by the expenditure of these sums, and a similar appropriation should be made this year. I would, however, suggest that the expenditure of this money should not be strictly limited to the deepening of the canal, but that such portion of it as is deemed advisable by the Superintendent of Public Works and the State Engineer and Surveyor should be made applicable to the purpose of rebuilding and repairing culverts, waste weirs and walls, many of which are in a very dilapidated condition. Concerning the ultimate obtaining of a radically enlarged prism for the Erie canal, I would call your attention to the very conservative and wise resolutions adopted by the canal convention held in Buffalo on the nineteenth day of October, 1892, and more especially to the first and second of said resolutions, and would respectfully recommend either that sufficient funds be placed at the disposal of the State Engineer to allow him to make a survey of the Erie canal from which to make plans for increasing the depth of water therein to nine feet at all points, except where it passes over culverts or through aqueducts or locks, where a minimum of eight feet of water should be obtained, and to report said plans to the next Legislature with his estimate of the cost of carrying the same into effect; or that the whole subject be referred to the expert commission recommended in a subsequent portion of this report, who shall determine whether such a plan of improvement as outlined above is practicable and desirable, and who, if their determination be in the affirmative, shall proceed to make the above-named surveys, plans and estimates.

The work of continuing the strengthening of the berme bank at Schenectady should be continued this year by an appropriation of $20,000.

Appropriation should also be made this year for removing the silt and building walls on the Oswego canal.

The present condition of the Champlain canal and the amount of traffic over it absolutely demand a vigorous prosecution of the work of improvement there. The dimensions adopted for this canal in its original construction were twenty-eight feet bottom width and four feet depth of water. Subsequently thereto an enlarged prism of thirty-five feet bottom width with five feet depth of water, was obtained over a large portion of its length. Chapter 399 of the Laws of 1874 fixes the dimensions of subsequent improvement to this channel of forty-four feet bottom width with seven feet depth of water, which was modified by chapter 185 of the Laws 1876, by changing the depth to be obtained to six feet and retaining the standard of forty-four feet bottom width.

All legislation since the passage of the last-mentioned law has either preserved the dimensions named therein or left the determination thereof to the canal officers, and in carrying out the improvements authorized the dimensions of six feet depth of water and forty-four feet bottom width have been rigidly adhered to.

Since 1874 the State has expended $1,025,000 in obtaining this enlarged area, and as a consequence the same now exists on about twenty-six out of the sixty-six miles of this canal. As the improvements heretofore made have been selected from its most contracted portions, the cost per mile of the work to be done can reasonably be expected to be decreased. It is estimated that for $1,000,000 applied entirely to the obtaining of this increased channel and not to repairing or rebuilding any of the bridges, culverts, aqueducts or other structures (except where the obtaining of the enlarged channel requires a change in these structures), this improvement can be completed. Until an increased width and depth is obtained over the entire canal, no increased draught of water beyond that now allowed by the canal regulations can be granted to boats engaged in through traffic. The only advantage as yet reaped by the above-named expenditures is the expedition obtained in passing over the improved portions of the canal, and this is not at all commensurate with the cost of the improvement.

On many of the unimproved portions of this canal, boats drawing four feet of water, if deflected only a few feet from the center of the channel, are grounded, and in many other portions of it it is impossible for loaded boats to pass each other.

That a channel of the dimensions named on this canal would be well worth its total cost I have no doubt, and I would, therefore, recommend such legislative action as would look forward to the completion of this improvement on the lines already laid down within the next three or four years.

Sufficient appropriation should also be made, estimated at $20,000, to provide for the cleaning out of old and digging of new ditches to carry off canal leakage in order to avoid just cause for complaint by persons injured, and decrease the large awards yearly made by the Board of Claims for unjustifiable injury inflicted by the State on private property.

ERIE CANAL AQUEDUCTS.

The attention of the Legislature is again called to the condition of the aqueducts through which the Erie canal makes two crossings over the Mohawk river and one over the Schoharie creek. The timber work of these important structures has for the past four or five years been rapidly decaying, and for the past two years has been in an absolutely dangerous condition. The timber protection against impact of ice which once existed at exposed ends of piers of the Mohawk aqueducts has almost entirely disappeared, and as a consequence some of the stone have already been broken or displaced, and the magnificent and costly masonry of these structures is exposed to danger of great damage. Serious settlement has occurred in the masonry of some of the piers of the Schoharie aqueduct which should if possible be checked before the damage reaches such a point as would require the entire rebuilding of the damaged piers and the stone arches connecting them. Any further withholding of the funds required to place these structures in a safe condition would, in my opinion, be unwise and would be in the line of extravagance rather than economy. So long as navigation is maintained on the Erie canal these structures must be preserved, and should we continue to ignore the danger which confronts us until a breach occurs during the season of navigation, the cost of the hurried repairs which it would then be absolutely necessary to make (to say nothing of the injury inflicted on traffic by a prolonged suspension of navigation) would largely exceed the cost of similar repairs made upon well devised plans during the season of non-navigation.

LOCK LENGTHENING.

The policy of lock lengthening adopted in 1885 had for its object not an increased capacity of the canal so far as it related to the number and size of boats which could navigate it, but rather the expedition of traffic which it secured and the consequent cheapening of the cost of transportation. Whether or not the sum already expended for this purpose might have been productive of greater good if applied to the enlargement and improvement of the channel itself, is a question upon which the opinions of competent experts differ, but this work has now progressed so far that it is almost idle to argue it. Of the seventy-two locks on the Erie canal, sixteen are at the Cohoes ascent and the cost of lengthening these would, in my opinion, largely exceed the value of the benefits to be derived therefrom. Two are between Cohoes and Albany, and as the bulk of canal traffic enters the Hudson river at West Troy, there seems to be no good reason for lengthening these. Five constitute the combined system at Lockport, and the same conditions exist here as at Cohoes. Two are located near the upper Mohawk aqueduct, and the alignment of the canal here renders it almost impracticable to lengthen them without rebuilding one or both of the entire structures.

Thirty-eight have been lengthened at an average cost of about $33,000 each. One of the three locks at Little Falls presents (owing to its alignment) engineering difficulties which would render its lengthening abnormally expensive, and as these three locks lie so near each other that the time lost in breaking up fleets in order to pass through them all would not much exceed that lost in similarly passing through one, the question of lengthening these may be for the present deferred. There then remain six locks, viz., two between Cohoes and the upper Mohawk aqueduct, one, one mile east of Little Falls and three at Newark, for the lengthening of which provision should be made, and I would recommend that at its ensuing session the Legislature authorize the lengthening of the three first mentioned. When the Newark locks are lengthened, the alignment of the canal for about three-quarters of a mile should be changed and two locks of twelve feet lift each substituted for the three eight feet locks now there, the estimated cost of which is $300,000. The lengthening of locks on the Erie canal has resulted in the adoption of a system of moving boats in fleets which has largely reduced the cost of transportation. Prior to the lengthening of these locks nearly all of the boats propelled by horse-power were single ones with teams of two to three horses attached to each.

Now it is a rare thing to see a boat engaged in through traffic towed singly, and it is found that two boats can be handled as expeditiously (except for the delay contingent on passing through the unlengthened locks) with three or four horses and one driver as was heretofore done with four or six horses and two drivers. Besides this the lengthened locks have largely increased steam navigation on the canal, and now a large (and indeed the only profitable) proportion of the traffic is done by steamers propelling, besides their own cargoes, that of from one to five other boats, and cargoes of 50,000 bushels of grain are often transported in a single fleet.

As the traffic over the Oswego canal is comparatively light, and as, owing to the swiftness of the current obtaining in some portions of its channel, it is doubtful whether the system of moving boats in fleets here has been or can be economically applied, I would advise that no further expenditures be made in lengthening the locks on this canal.

WATER SUPPLY.

The Legislature of 1892 authorized the improvement of the water supply to the Erie canal by the completion of the dam at Forestport for the purpose of creating a reservoir increasing the present storage of the flood waters of the Black river, which are fed to the Erie canal through the Black River canal. It also authorized the completion of a stone dam across the Mohawk river at Little Falls to replace the dilapidated timber dam now there. When these two much needed improvements shall have been completed, and some repairs made to the dams at Schoharie creek and Rexford Flats, and the Rocky Rift feeder cleaned out, I think the problem of a sufficient water supply for the Erie canal with the present dimensions will have been solved.

While this is a fact, in view of the possibility of a future demand for the material increase in the capacity of this canal, I think the policy of the State should be firmly set against any project looking towards the surrender of any of the water rights along its line which the State now possesses.

The Legislature of 1892 also made provision for raising the dam across the Beaver river at Stillwater, which was built in

1886 for the purpose of storing the flood waters of the Black river, in order that a well-regulated supply might be maintained during the dry season of the year, as a compensation, to the property owners interested, for the diversion of water made by the State in building the Forestport reservoir as a feeder to the Erie canal. It having been found that the capacity of the reservoir thus made was not sufficient to make a full restoration of the waters thus diverted for State use it was decided to raise this dam an additional height of five feet. When this is completed I think the State will have fully discharged all of the equitable obligations resting on it in this matter.

Contracts for the completion of the Forestport dam, for making necessary changes in roads and bridges crossing the reservoir, and for clearing the timber from the grounds proposed to be flooded, were awarded to Messrs. Beckwith & Quackenbush at prices which will secure the entire completion of the work (except a small proportion of the clearing) within the limits of the appropriation. Owing, however, to the abnormally large rainfall of the past summer the work has not progressed so rapidly as I had hoped for and will not be completed until next year.

A contract for completing the Little Falls dam was awarded to Rapp & Co. The excessive amount of rainfall heretofore referred to has also prevented such rapid progress in this work as I had hoped for, and work here has been suspended until the period of low water next summer. In the prosecution of this work, however, the fact has been developed that the rock in the river bed, upon which the dam is to be founded, lies at a lower elevation than was supposed, and therefore the quantity of masonry necessary to complete this structure will be considerably in excess of that contemplated at the letting of the contract. An additional appropriation of $6,000 will be required to complete this work and I recommend that it be made by you.

A contract for the raising of the dam at Stillwater has been awarded to F. Louis Faass & Co. at prices which secure the entire completion of the work within the amount of the appropriation, but owing to the causes heretofore mentioned the completion of this work cannot be secured until the period of low water next summer. In the forming of the new reservoir at Forestport, care has been taken to remove the timber from the ground which it is proposed to overflow and thus avoid the mistake heretofore made in building reservoirs in the Adirondack region, of creating vast areas of dead timber.

The Stillwater reservoir furnishes a marked example of this error, and what would otherwise be a beautiful sheet of water is transformed into a scene of desolation. I would respectfully recommend the appropriation of the sum of $5,000 to remedy in part this evil.

Attention has been called from time to time in the annual reports of this department to the dilapidated condition of many of the seventy two locks of the Black River canal lying between Rome and Boonville. Within the past five years five of these locks have been rebuilt at an average cost of about $14,000 each.

Eleven of them are now in such dangerous condition that their entire failure may be expected at any time, and eight others should be shortly rebuilt. Should one of these locks fail during the season of navigation, it would, of course, suspend traffic on the Black River canal; but this would not, of necessity, prevent the continuation of the feed from Forestport to the Erie canal, as temporary expedients could be adopted either for continuing the feed through the channel of the canal itself or through the bulkhead on the Mohawk river at Rome.

Several attempts, more or less successful, have been made within the past few years to decrease the large amount of leakage which now exists in the Glens Falls feeder, through which the summit levels of the Champlain canal receive their water supply. I think this work should be again taken up, though in view of the other large demands for more important work I doubt the advisability of making an appropriation for this purpose this year.

Chapter 155 of the Laws of 1892 directs the State Engineer and Surveyor to make an examination of the dams across the Hudson river at Troy and the Mohawk river at Cohoes, and report to the Legislature the condition of these structures in detail, with estimates of the cost of new dams, should it, in his opinion, be advisable to construct the same. Owing to the very remarkable fact that during the past summer water has been flowing almost continually over the crest of the Troy dam, it has been impossible for me to make the examination of this structure which I had hoped for, and I, therefore, fear that I shall not be able to report final conclusions thereon to you. A survey and examination has been made of the Cohoes dam, the results of which are now being tabulated and studied, and a special report upon this subject will be made to you at a future day.

The dam at Baldwinsville is a wooden structure in a bad state of decay. Danger of a break in this structure is imminent and it should be rebuilt, though whether or not the State should bear the entire cost of such rebuilding is a question for legislative investigation and decision. I estimate the cost of building a new structure here at $35,000.

The history of this structure is briefly as follows :

The State originally granted to the Baldwins the right to build a dam and sell the water privileges and also to build a canal and lock from the dam to a point on the river half a mile below for the purpose of navigation, with right to collect toll.

Chapter 153 of the Laws of 1850 authorized the Canal Commissioners to take possession of the dam, lock and canal erected by the Baldwins, and authorized and directed the canal appraisers to ascertain and fix a just and equitable compensation to be given to them for their estate, title and interest therein. In 1853 the damages were agreed upon and a final settlement completed with the Baldwins by which the State paid to them $9,519.16 in full for all of their interests.

Section 8 of the law referred to provides that the Canal Commissioners shall maintain a State dam across the Seneca river at Baldwinsville, and ever since the settlement with the Baldwins the canal officers have had the entire care, possession and control of the canal and dam.

The questions, therefore, arising here are: First, do the interests of the canal justify the large expenditure necessary to maintain this branch of it, or should it be either abandoned or turned over to other parties? Second, if the first question should be answered in the affirmative, would not such action be in violation of section 6, article 7 of the Constitution? Third, if it should be decided that the dam must be maintained, would the fact that its existence creates a water power here of considerable value justify the State in asking the parties benefited thereby to contribute towards its cost? This matter demands your serious consideration, as whatever may be the answer to these questions, the fact can not be disputed that the State is now in possession of and responsible for this structure, and should a sudden breach in it occur, damages would be inflicted on property lying below it, for which the State would certainly be liable and which would probably largely exceed the cost of a new structure.

CANAL BRIDGES.

In several of the cities or populous villages through which the canals pass they are spanned by bridges (generally built of cast iron), which, at the time of their erection, were amply sufficient for the traffic to which they were exposed, but owing to the growth of these localities and the increase of large manufacturing institutions these bridges are now exposed to concentrated loads for which they were not designed and to which they can not be adapted. They should be replaced by structures of greater capacity and more modern design. Those which I consider in the most dangerous condition, and for the rebuilding of which provision should be made during the present session, are five in Buffalo, one in Rochester, one in Little Falls, one in Amsterdam and one in Glens Falls; total nine, at an average cost of $6,000 each. Chapter 366 of the Laws of 1891 lays down certain principles to be applied to the question of rebuilding canal bridges, and I think a proper interpretation of its terms is that where bridges exist which are so radically weak or so contracted in dimensions that new structures are required in order to "preserve in a safe and substantial manner the continuity of such streets or roads, and not unnecessarily to impair their usefulness," the cost of building such new structures should be borne by the State, but where merely for the convenience of traffic a lesser grade and consequently a movable bridge, or where from æsthetic considerations a bridge differing from the general design adopted for fixed canal bridges is desired, the cost of such improvements should, if the present structure is of sufficient size and strength to accommodate the traffic, be borne entirely by the municipality benefited, and if the present structure is unsafe the State should contribute no more than the cost of proper repairs to, or rebuilding of existing fixed bridges. In judging of the question as to whether an existing structure unnecessarily impairs the usefulness of a street, regard should be had to its present traffic and not to that which existed at the time the structure was erected.

BUFFALO HARBOR.

The large commerce of this port demands, I think, the continuance of the policy heretofore adopted of improving the same. The terms under which a portion of this harbor was acquired by the State, in my opinion, create at least an equitable obligation on the State for such maintenance of it as the just demands of commerce may require. The deepening of the channel of the Erie canal through the city of Buffalo, for which the last Legislature made an appropriation of $20,000, should be prosecuted to completion. This latter work consists of expensive submarine rock excavation and not more than one-third of the needed improvement can be made under the present law.

CEMENT TESTS.

Since the year 1886 all cement intended for use in the construction of the State work has been submitted to a very thorough and systematic test with the most approved apparatus, and all cement falling below a certain required standard as to strength, fineness, etc., promptly rejected. It is believed that the system now in use as to sampling, testing and marking for identification will most effectually prevent the use of any inferior cement.

The knowledge that all cement used on State work is subjected to a thorough test acts as a check on any attempt to palm off worthless articles. When this system was first inaugurated a large proportion of samples offered to us were rejected, but for the past two years very little cement has been offered by manufacturers which has not fully met all of our requirements. The only way, however, to secure these good results is to continue the system of testing.

A serious of long time tests have been conducted for several years past, and are still being continued, and the results of these when published will be of considerable interest to parties interested in masonry construction. The standard specifications for cement, having been published in former reports, are omitted here.

ALBANY BASIN.

A bill contemplating the entire abandonment and filling up of the Albany basin, afterwards amended so as to maintain the lower portion of it, but to entirely fill up and abandon the upper part lying between lock No. 1 and the Columbia street bridge, was last year introduced into the Legislature, but failed of passage. The report of the committee of thirteen of the city of Albany, made since the adjournment of the last Legislature, as well as the action of the canal convention held at Buffalo in October, 1892, would indicate that this matter is again to be made the subject of legislative consideration. The bill, as amended, provided for the entire abandonment and filling up of the upper portion of this basin, the surrender of all of the rights and interests of the State therein, and the vesting in the property owners adjacent thereto on the westerly side of the basin all right and title to this property without any consideration being paid by them (except the cost of the reclamation of land), regardless alike of the property interest of the State and equitable interest of the adjacent land owners on the easterly side or pier. While I am of the opinion that some changes in the present form and dimensions of this basin should be made, no scheme should be tolerated which looks toward the complete closing of any portion thereof, and any improvement here should be made upon a basis which will secure the continued existence of an ample passageway for boats from its southern extremity to the lock. I must also express my dissent from any legislation taking away from the proper State officers the control of any such improvements as may be decided upon. As indicating the further position of this department on this subject, I would call your attention to the recommendations made on pages 19, 47 and 48 of the report of the State Engineer and Surveyor for the year ending September 30, 1889, and pages 21 and 54 of the report of the same officer for the year ending September 30, 1890, and also to the following letter upon this subject addressed by me to the Hon. Amasa J. Parker, who introduced the bill referred to in the Senate of 1892:

Hon. AMASA J. PARKER, *Senator:*

DEAR SIR.— As requested by you this morning, I have made an attempt to amend Senate Bill No. 886 in accordance with the principles that, in my opinion, should cover the proposed legislation, and after a careful examination of the proposed bill, the decision of the Court of Appeals in the case of Follet v. The People, as recorded in the Twelfth New York Reports, and also the opinion of the Attorney-General given in a letter to the Hon. James Shanahan, Superintendent of Public Works, and dated April 21, 1884, have come to the conclusion that it would be necessary to rewrite almost the entire bill in order that it should be made to conform to what I believe the present legal status of the case and the protection of all the interests involved would require. The whole bill proceeds upon the theory that there is vested in the city of Albany some right and title in this basin, and provides as a condition precedent to any work being done therein that the consent of the city of Albany must be obtained, to which proposition I can not give my approval. Accepting as final the decision of the Court of Appeals that this basin does not constitute an intrinsic portion of the canals of the State, it is evident that the same decision plainly enunciates the fact that the basin is the property of the State and of no one else, and that the present law requires that it "shall remain free for canal craft and shall be owned by and remain the property of the State." Were it not for this last quoted clause of the act of 1849, I would be inclined to the opinion that your object could be accomplished without legislation (except in so far as you might consider legislation necessary to enable the city of Albany to incur any debts that might be necessary for the proposed change of alignment of said basin) by an application to the Commissioners of the Land Office to exercise rights and duties already vested in them by law. I would, therefore, suggest that the bill be so written as to authorize the Commissioners of the Land Office to grant to the parties entitled thereto such of the lands under water in the Albany basin, if any, as may in their opinion be released without detriment to any of the interests of the State or its commerce. I think, however, the better course in this connection would be to secure the passage of an act creating a commission composed of representatives of the several interests involved, to which commission shall be intrusted the duty of making a careful examination into the whole subject-matter and reporting their conclusions to the next Legislature. This is a very important subject, and I should be very loth to commit myself hastily to any project that might impair even in the slightest degree the usefulness of the Albany basin as a harbor. In view of the fact that the State has, during the past three years, expended upwards of fifty thousand dollars in dredging out this basin and the fact also that there seems to be great ground for hope that the national government will in the near future undertake a radical improvement of the upper portion of the navigable part of the Hudson river, the policy of filling up or even materially contracting the area of the basin would seem to me questionable. I am, however, very clearly of the opinion that some slight changes in the alignment of the basin ought to be made and a different location obtained of the mouths of the sewers of the city of Albany.

Respectfully.
(Signed) M. SCHENCK,
State Engineer and Surveyor.

As a result of the expenditure of the $50,000 which the State has made within the past few years in the dredging out of this basin, there was obtained, upon the completion of the contract with P. W. Myers in 1890, a depth of seven feet of water over the entire area thereof, except where the obstructions of the State and Columbia street bridges and the steamboat piers prevented, and this condition, to a large degree, obtains to-day, except at the mouths of the sewers, where large deposits have been formed. It will, therefore, be seen that if the city of Albany could so arrange its sewer system as not to discharge the entire drainage of the city into this basin, there would be no sanitary reasons for taking the proposed action.

LIFT BRIDGE OVER ERIE CANAL AT WATER STREET, ALBANY.

Chapter 394 of the Laws of 1892 authorizes the construction, at the expense of the property benefited thereby, of a lift bridge over the Erie canal at Water street in the city of Albany and entails upon this department the duty of making the plans and specifications therefor. These plans and specifications are now nearly completed and I will shortly transmit the same to the board of contract and apportionment of the city of Albany, with a report, as required by the law referred to, stating that plans as prepared can be carried out at a cost not exceeding amount named in the law, viz.: $12,000.

SURVEY FOR THE STATE BOARD OF CLAIMS.

In order to make a proper defense of the rights of the State in the numerous suits brought before the Court of Claims the Attorney-General usually requires a survey and map of the premises on which the alleged damages are claimed to have occurred, and the duty of making such surveys and maps is required by law of this department.

For the purpose named the sum of $5,000 has been appropriated annually for several years past, which sum for the past two years has proved inadequate for the work required. During the past year the appropriation was used in making a partial survey of the large number of claims on the Oswego river, but owing to a lack of funds to complete these surveys a large number of claims, aggregating several hundred thousand dollars, remain untried. In view of the great importance of these surveys to the State it is very desirable that a sum be appropriated sufficient to complete the balance of the Oswego river work and also to provide for the requirements of the coming year. Your attention will probably be called to this matter by the Attorney-General.

SURVEY OF CHEMUNG CANAL.

Chapter 435 of the Laws of 1892 directs the State Engineer to make a survey of the Chemung canal and to transmit to the Legislature of 1893 a map of the same, with a report of his conclusions as to the obligations, if any, resting on the State or other parties to abate alleged nuisances now claimed to exist, and to report his recommendations as to the proper plans to be adopted to discharge the obligations of the State, with his estimate of the cost thereof. The necessary surveys have been made and maps and plans are now in course of preparation; all of which will be submitted with a special report at a future day.

ELECTRICITY AS CANAL MOTIVE POWER.

The rapid advance which has been made within the past few years in the study of the science of the application of electricity as a motive power is, I think, sufficient to justify a belief, or at least a hope, that some efficient and economical means of its application to inland water transportation may soon be discovered; and I would, therefore, suggest the propriety of enacting into law some well-devised scheme offering to electrical investigators and inventors some adequate incentive to a prosecution of their inquiries in this direction; and also that provision be made giving to investigators the right to use, under the supervision of the Superintendent of Public Works, and subject to such regulations as he may deem wise, the channel of the canal for experimental purposes. In adopting any such legislation, however, regard should be had to the almost complete failure of a policy heretofore pursued offering rewards for adaptation of steam to canal navigation; the causes of such failure ascertained, and avoided now. Some available power now exists which could be applied to the generation of an electric current for this purpose, but in order to apply this system to the whole canal this power would have to be largely augmented. In order to obtain a regulated feed of water to the canal, in addition to the water sent down by lockages, a constant feed through the culverts between the locks has to be maintained in varying quantities at the several locks, reaching its maximum at the locks at the foot of a feeder level and being reduced to nothing at the lock immediately above a feeder level. The water thus fed might be utilized in generating such portions of the needed power as it is capable of doing, but as the average lift of the locks is only eight feet, and as, even if the water supply were abundant, it would be adverse to the interests of commerce to generate a larger current of water in the canal than that necessary to supply the loss from filtration, evaporation, leakage and lockages, and as on summit levels no water power exists now (though some could be secured in many places from adjacent streams), it would seem that any successful solution of this question will have to be based largely on the use of steam power.

PROPOSED SHIP CANAL.

A measure is now pending before Congress appropriating $100,000 for the purpose of making a survey with the view of building a ship canal from the Hudson river to the great lakes, and it is to be hoped that the measure may become a law for the reason that the information to be derived from such a survey would be well worth the cost. The scheme of building a huge connecting channel between the ocean and lakes, capable of bearing the largest ocean vessels is, a most pleasing picture to contemplate, but there is such a vast array of difficulties between the projection and consummation of the scheme as to cast a shadow on it.

The difficulties to be encountered, although perhaps not insurmountable in these days of advanced engineering and mechanical science, are very great. The question of an adequate water supply, to be obtained without very serious detriment to an immense number of large manufacturing interests, is a very grave one, and the vast sum of money required to complete the proposed work appalling. It is perhaps true that a supply of water for the eastern portion of the proposed canal might be obtained by the diversion of the waters of the whole western watershed of the Adirondacks, but in that event what compensation shall be made to the vast manufacturing interests that now receive their supply from that locality? As to the cost of the contemplated canal, although no figures for close approximation are to be had, it is quite safe to assume that with the necessary number of locks or lifts, reservoirs, basins and such number of draw bridges as would not make this channel a calamity in the more populous localities, it would cost at a conservative estimate, not less than a half billion of dollars. The two principal reasons advanced for the construction of this gigantic work are, first, the necessity for a channel through which war vessels may be sent through United States territory from the ocean to the lakes; second, that grain may be sent from Duluth to Europe without breaking bulk. In regard to the first, reasoning from current events, it seems not only possible but even probable that if the proposed canal were begun to-day and progressed with reasonable rapidity, upon its completion we would find that the present northern international boundary had ceased to exist. In respect to the second question, the existence of the modern elevator renders it no longer a serious one, as the best informed grain shippers are largely of the opinion that the benefit to the grain in being transferred at Buffalo and New York more than compensates for a fair cost of handling; thus the question of breaking bulk may be dismissed as unworthy of consideration.

In transporting grain from Duluth to Europe there are at present in use three classes of vessels (viz., the lake, the canal and the ocean vessel), and this state of affairs is likely to exist for many years to come.

The ocean steamer, with her tremendous height and bulk, will never with any degree of economy pass through a canal over 300 miles in length, nor do I believe that any number of the existing lake steamers will in competition with the ocean steamer carry grain to Europe. The practical canal of the future, connecting Lake Erie and the Hudson river, ought to be one capable of bearing barges 250 feet in length by twenty-five feet breadth of beam, of a draft not to exceed ten feet and of such height that the great majority of bridges that shall span this canal may be fixed structures instead of draw bridges. With this proposed canal (which can be built for a reasonable sum) bearing barges towed in fleets, each boat carrying 50,000 bushels of wheat, New York will be enabled to hold her commercial supremacy against all comers for many years to come. Having this great desideratum in view, I would recommend to your honorable body that an act be passed requesting the Executive to appoint a commission whose duty it shall be to examine into this matter and to report its conclusions to the Legislature at the earliest time practicable.

HUDSON RIVER IMPROVEMENT.

The last Legislature, like the preceding ones of nearly forty years past, made an appropriation for the purpose of removing bars and otherwise improving the channel of the Hudson river between Troy and Coxsackie. The amount appropriated for the current year was $43,000, $8,000 of which was for the purpose of improving the west channel at Coxsackie, $5,000 for improving the east channel at Stuyvesant, $3,000 for the improvement of the west channel at Coeymans and the balance, $27,000, to be devoted to dredging the main channel of the river, repairs to State dykes, etc. The continued neglect on the part of the general government to appropriate funds for the improvement of the Hudson has made State appropriations vitally necessary in order to protect the navigation of this great commercial highway, but, as the United States authorities now have a fund provided and contracts for the work of improvement of the main channel have been entered into, there will probably be no occasion for any State appropriation for removing bars from the main channel of the river. There are, however, many needed repairs to be made to existing State dykes, and several thousand dollars are required to widen and complete the side channels both at Coxsackie and Stuyvesant, and I would recommend that a moderate appropriation be made for the purposes named. I would call your attention to the annexed report of Assistant Engineer Charles G. Whitbeck, who has been in charge of the Hudson river improvement for the past year, in which report is given an interesting history of the connection of our State with the improvement of this great highway that is very complimentary to State management.

THE SHINNECOCK CANAL.

The close of the present year has witnessed the completion of the Shinnecock canal, connecting the waters of Peconic and Shinnecock bays on Long Island, at a total cost of about $98,000.

This work was begun in the year 1886, and has been prosecuted intermittently under various appropriations that were made from time to time, and has by reason of this policy of insufficient appropriation cost about $10,000 more than originally estimated. The original design of this channel was to furnish from Peconic bay a supply of salt water to Shinnecock bay, which had become land-locked by reason of the closing of the inlets leading from this latter bay to the ocean, whereby the shell fisheries and other fishing interests had became worthless. Several attempts had been made to open and maintain a channel from Shinnecock bay to the ocean on the south, which had thus far resulted in failures, and as a consequence, a great many fishing industries were entirely destroyed and a whole community were obliged to seek a livelihood in other pursuits.

During the last three years the water has at certain seasons of the year flowed through this canal, just completed, at periods of very high tides, and the effect upon the oyster growth in Shinnecock bay has been gratifying in the extreme. Three years ago there probably did not exist in the whole bay a single barrel of these shell-fish, while last year more than 25,000 bushels of seed oysters were taken out and sold for purposes of planting in other localities, and the year has witnessed the gathering from this bay of thousands of barrels of mature oysters of the finest flavor, valued at a conservative estimate at $100,000. In addition to the original idea of making this channel one for the purposes of getting a supply of water to Shinnecock bay, an item was last year inserted into the supply bill appropriating the sum of $10,000 to complete the canal, build a draw instead of a fixed bridge, and extend the dredging out to the deep waters of the bay, and the result has been the obtaining of a first-class channel for purposes of navigation for vessels of six or seven feet draught. This last is an item of considerable importance to the many inhabitants of eastern Long Island and to the many summer visitors to that vicinity.

Owing to the difference of levels of the two bays and of the times of high tide, it was found necessary to construct a stop-gate to prevent serious wasting of the canal banks, which are composed entirely of sandy soil, and the consequent filling of the channel.

Sufficient time has not yet elapsed to test the efficacy of this gate, but I am of the opinion that it will fully meet the requirements for which it was constructed. Personal observations made through a period of several weeks last summer convince me that the canal will not only restore the shell fisheries to their former condition, but that it will also materially aid in keeping open a channel connecting the Shinnecock bay with the ocean, should one be constructed in the future.

INSPECTION OF IRON HIGHWAY BRIDGES.

Chapter 568, Laws of 1890, provides that "No town or its officers shall be compelled to accept or pay for an iron or steel bridge exceeding 200 feet in length, or having a span or spans exceeding 100 feet in length, constructed therein or upon its borders, until the State Engineer and Surveyor shall certify to the completion of the bridge, pursuant to the contract under which it shall have been constructed, with his approval of the manner of its construction and the material thereof; and all contracts made for the construction of any such bridge shall be subject to the provisions of this section."

It will be seen from the section quoted that no obligation whatever rests on the town authorities to require the services of this department, nor are any provisions made looking to the furnishing to this office of any plans or tests of material; still when called upon the State Engineer is required by the statutes to certify to the proper construction of the bridge and the material thereof. Several cases have been brought before this department during the past year, and in but one case was there any test furnished upon which a certificate as to material could be given, and in this case only after a long series of inquiries and many affidavits furnished showing that samples of material produced and sent to this office after the erection of the bridge were samples of iron actually used in its construction.

The law as it now stands is faulty in the extreme and should be amended or repealed. My predecessor in 1890 took occasion to call the attention of the Legislature to this matter in words as follows:

"The law, as quoted above, gives no opportunity for the intervention of the State Engineer and Surveyor until after the completion of the structure, and his intervention at that time might result in serious complications, as, for instance, in a case where a structure was duly built in accordance with the contract which had been made, but where either the material or design might not be such as would have been approved by the State Engineer and Surveyor.

"It is suggested that if it is desirable that the State Engineer and Surveyor should have anything at all to do in this matter, provisions should be made for inspection and approval by the State Engineer, or by an expert under his direction, of all plans and specifications for such structures before contracts are made, and for requisite inspection of material during construction and approval of the structure when completed."

Your attention is also called to the fact that a bill to amend the clause in question was introduced last year, but failed to become a law, and it is sincerely hoped that a similar bill may this year be passed or that the section as it now exists may be repealed.

BOUNDARY LINE BETWEEN THE COUNTIES OF ERIE AND GENESEE.

By chapter 483 of the Laws of 1892 the State Engineer and Surveyor was authorized and required on or before the first day of January, 1892, "to examine the statutes bearing on the boundary line between the counties of Erie and Genesee, and take such legal testimony, documentary or otherwise, as may be offered, and from such statutes and testimony, to locate and determine the correct boundary line between the counties of Erie and Genesee, and more particularly the correct division county line between said counties between the town of Newstead in the county of Erie, and the town of Alabama in the county of Genesee, and to file said determination in the office of the Secretary of State, which survey and determination shall be conclusive upon the subject until the Legislature shall by law otherwise direct."

In pursuance of the provisions of the aforenamed act the various statutes and public records bearing on the subject were examined and on December fifteenth a hearing was held at this office at which time representatives of both counties appeared. Several witnesses were examined and briefs submitted by the attorneys of the contestants, and on December twenty-eighth, I filed with the Secretary of State the following determination:

"In pursuance of provisions of chapter 483, Laws of 1892, I hereby fix and determine the correct boundary line between the counties of Erie and Genesee as being the line between the fourth and fifth ranges of the Holland Company's Land as same was surveyed, marked and determined in the year 1800, as shown on notes of said survey on file in the office of the Secretary of State, for all portions of said line lying outside of the original Tonawanda Indian reservation, and for that portion of said line lying within said original Tonawanda Indian reservation I hereby fix and determine the correct boundary line as a right line passing through monuments numbers one (1) and eleven (11), as shown on accompanying map, said monuments being respectively on the north and south boundaries of the original Tonawanda Indian reservation and marking points determined by said Holland Land Company as being points on the line dividing the fourth and fifth ranges of townships."

Whether or not this determination is in accordance with the equities of the case is a matter for an after consideration as the statute clearly required me to determine the line as fixed by existing statutes and gave me no latitude to consider equities nor suggest remedies.

THE LAND OFFICE.

By constitutional provision the State Engineer and Surveyor is a member of the Board of Commissioners of the Land Office, and as such member, among other duties, has charge of the examination of maps and papers pertaining to applications for lands under water, unappropriated State lands, etc. There have been received and considered during the year seventy-five applications for grants of lands under water, fifty-two of which were for beneficial enjoyment and the remaining twenty-three for purposes of commerce. These lands were situated in nine different counties of our State, and as in several cases disputes have arisen that have required personal examinations, such examinations have been made either by me or by Mr. H. C. Parsons, the engineer in charge. Seven applications for grants of mineral lands have been received and referred to the State Treasurer and State Engineer for determination, who, sitting as a committee, have received briefs and testimony bearing on several cases.

Twenty-two sales of land, aggregating $9,507.50, have been made by this department during the fiscal year, and a number of propositions for sales are now pending. To this department a number of disputed town or county boundary lines have been referred and suitable action taken in each of the several cases.

SARANAC RIVER IMPROVEMENT.

During the session of the Legislature of 1892 a bill was introduced providing for the removal of decaying vegetable matter, deleterious to the public health, from the Saranac river, at or near the village of Saranac Lake. This bill failed to become a law for the reason that the interests involved were not well understood at that time.

After a personal examination of the premises made by the Governor, I was requested by him to examine the case and report to the Legislature what action, if any, ought to be taken.

In compliance with this request I made an examination of the premises, and as a result thereof, came to the conclusion that this was a case where a small appropriation would be productive of much public good, although it might have the appearance of being of local benefit only.

The village of Saranac Lake is a sanitarium of great State, and even national, importance, and as the existing nuisance bids fair to very much impair if not destroy the usefulness of this place as a health-restoring resort, I am of the opinion that a sum sufficient to remedy the existing evil should be appropriated by this Legislature, and do so recommend.

NIAGARA FALLS RESERVATION.

Under the various acts appropriating moneys for the improvement of the State Reservation at Niagara Falls, the State Engineer and Surveyor is authorized, when required by the reservation commission, to make surveys, maps, estimates, etc. Recently this department has been called upon by resolution of the board of commissioners to report to that body what steps should be taken to lay out and construct a roadway from the reservation to Lake Ontario.

With this object in view examinations are now being made, the subject-matter studied and a report is being prepared for presentation to the board of commissioners.

It is to be hoped that an appropriation sufficient to begin operations on this important and desirable work, outlined by the resolution referred to, may be provided by this Legislature.

ENGINEERING WORK AT THE STATE CAPITOL, STATE HOSPITALS AND OTHER PUBLIC BUILDINGS.

This department has, from time to time, been called upon for professional information and assistance relating to the construction of the State Capitol, proposed water supplies for State hospitals and prisons, dock at Sing Sing and other work connected with public buildings. Considerable time and attention have been given these matters by both the State Engineer and the Deputy State engineer, and one or more of the office staff have been engaged most of the season upon work connected with the aforenamed subjects.

MUNICIPAL CONSOLIDATION INQUIRY.

By provisions of chapter 311, Laws of 1890, the State Engineer and Surveyor is ex-officio a member of the commission created by that law to consider the advisability of consolidating into one grand municipality the several cities and towns located on or near New York harbor, and as a member of such commission has given considerable time and attention to the subject, attended the various meetings of the board, etc. Consolidation in some form seems to be most desirable, and to that end the necessary legislation to enable the several cities and towns interested to express their approval or disapproval of the scheme will be asked of your honorable body at this session. As consolidation is a matter of the greatest interest to all concerned, it is hoped that such legislation may be had as will enable the citizens of the different municipalities interested to express severally, through the medium of the ballot, their views on this important subject in the freest and fullest manner.

PROPOSED EXHIBIT AT THE WORLD'S COLUMBIAN EXPOSITION.

This department having been invited by the chief executive officer of the board of managers for this State of the World's Columbian Exposition to make an exhibit at Chicago, showing the system of waterways owned and maintained by this State, I made application for space in May last, and during the month of October was assigned in the Transportation Building fifty feet by thirty feet of floor space and eighty feet by sixteen feet of wall space. It is proposed to exhibit a relief map fifty feet by fifteen feet showing the canal system of the State and its feeders; a wall map fifty by twelve feet exhibiting the water routes from Duluth to New York city; models of locks, both the first built and those now in use; large photographs of lake, river and canal fleets; models of the earliest and of modern canal boats, and other objects of interest connected with water transportation within the borders of our State.

The relief map is now being constructed, is well under way, and most of the photographing completed.

It is hoped and believed that the proposed exhibit will be a most interesting and creditable one.

THE QUARANTINE ESTABLISHMENT.

By chapter 270 of the Laws of 1888 the State Engineer and Surveyor was made a member of a board of commissioners having charge of repairs and improvements of the quarantine establishment of the port of New York. Considerable of my time and attention has been given to matters connected therewith.

The Legislature of 1892 appropriated the sum of $20,000 for care and maintenance; $25,000 for the building of a new boat for the health officer of the port and repairing of the old boat then in use by him, and $43,000 for completion of the riprapping and other necessary repairs to the quarantine islands and the boarding station on Staten Island. This last item of $43,000 failed to receive the governor's approval; hence nothing has been done at the quarantine islands except ordinary repairs, which were paid for out of the care and maintenance fund, and several thousand dollars' worth of much needed repairs to the buildings at the boarding station on Staten Island, which repairs were paid for out of the same fund. The contract for building the new boat and repairs to the old was awarded to Ramsey & Son, of Perth Amboy, N. J., upon approved plans and specifications, for the lump sum of $25,000.

The work is well under way and will probably be completed in the course of a month, and I am of the opinion that the contract has been a most advantageous bargain for the State. The completion of the riprapping at the lower quarantine island should be provided for at once for the reason that much damage is being done by the action of the waves during storms to the work already completed but unprotected by riprap.

During the prevalence of cholera last season the fact was shown that the quarantine facilities were entirely inadequate in times of great peril, and this Legislature will be asked for a sum sufficient to enable the quarantine board to enlarge and improve one or both of the quarantine islands, and this department is now making a survey with this purpose in view.

The emergency existing last fall, caused by the presence of Asiatic cholera at our ports, rendered the acquisition of Fire island a positive necessity in order to temporarily meet the demands of the situation. There is, however, little likelihood that any part of Staten or Long island will be permanently used as a place of detention for quarantined persons or property, and hence arises the imperative necessity for the immediate enlargement of the present quarantine facilities of the State. Due regard to proper hygienic principles requires that these increased facilities be obtained either by the enlargement of present islands or the building of new ones.

STATE SURVEY.

I wish to call your especial attention to the lack of information now existing concerning the geographical, topographical and geodetic features of our State. It was very aptly said, a few years ago, by an eminent astronomer, that we possess a better map of the moon than we have of the State of New York; and it is a matter of great surprise to me that the citizens of this State, who have accomplished so much in commercial, industrial and literary pursuits, should have so long allowed themselves to remain in such great ignorance on this important subject.

I desire to express my appreciation of the importance of continuing a policy, in pursuance of which a small beginning was made last year, active co-operation with the National government in the work now being prosecuted by it in this direction, and to state the opinion that by this means alone we can hope for an expeditious and economical attainment of that much-to-be-desired result, namely, the possession of an accurate and reliable topographical map of our State. I am aware that efforts made heretofore by the State alone have not been productive of results that should have been obtained by the expenditures that have been made, but when we examine the work that is now being done by the National government, and consider the cost thereof, we see nothing to discourage us in entering into the policy which I now recommend.

There are now on file in this office all of the maps of this State, as well as many of those of other States, which have up to date been completed by the United States officers, to the inspection and examination of which I invite the attention of any member of your body, or any citizen of the State interested in this subject, convinced as I am that either a cursory or careful examination thereof will show to the most skeptical the great value of these productions.

Investigations made by me contingent upon the preparation of a relief map of this State, which it is proposed to exhibit at the Columbian Exposition, have strengthened my previously-formed opinion that the maps now in existence, representing not only the State as a whole, but also the separate counties thereof, are full of errors and absolutely unreliable. The work of the State survey has resulted in establishing a very satisfactory scheme of triangulation over about two-thirds of the area of the State, but the only result of this is the obtaining of a skeleton, consisting of detached points whose relation to each other is known, and this skeleton can not be made of any practical value until the political divisions and topographical features of the country are filled in thereon. The State of New York embraces about 50,000 square miles of territory, and the United States authorities estimate the cost of doing the necessary field and office work (exclusive of engraving) at ten dollars per square mile.

The following extract from a letter lately received by me will indicate what has been done by the National government up to the present time and the cost of the same:

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY, GEOGRAPHIC BRANCH,
WASHINGTON, D. C., *December* 16, '92.

Hon. MARTIN SCHENCK, *State Engineer and Surveyor*, *Albany*, *N. Y.:*

DEAR SIR.— * * * As I presume you are desirous of knowing the condition of the work of the topographic survey in your State, I will summarize it by stating that prior to this year there had been mapped sixteen atlas sheets of about 225 square miles each, lying wholly or partly within the limits of the State of New York. During the past season we have completed the mapping of the equivalent of nine additional sheets. These are Elizabethtown, Westport, Marcy, Cohoes, Schenectady, Coxsackie, Durham, Kaaterskill, Poughkeepsie, and portions of the Salem and Old Forge sheets.

The engravers have already delivered, and within a couple of weeks we will print copies of the Clove, Troy, Albany and West Point in addition to those which you have already received.

It may interest you to know that the total area mapped during the past field season in the State of New York was 1,850 square miles, at a total cost for field work of $13,645, exclusive of the cost of primary triangulation and supervision. Including these items, and estimating the cost of completing the office work on these sheets, the total cost of mapping and drafting 1,850 square miles will be $18,780, or at the rate of ten dollars and fifteen cents per square mile. As you are aware, the State appropriated $3,000 of this sum.

I am yours sincerely.

H. M. WILSON,
Geographer.

The results obtained by the appropriation of $3,000 made by the last Legislature have been abnormally large owing to the fact that the condition of the national fund applicable to this purpose was such that had it not been that by the use of this fund the State was enabled to pay the field expenses of the parties prior to the time when the United States appropriation became available, little or no work could have been done in this State before the first of July, whereas by the use of this small fund four survey parties have been kept at work during the whole season. The cost for the proper surveying and mapping of the 48,000 square miles yet to be covered in this State would be $480,000. If this expense should be equally divided between the National and State governments, and the work prosecuted at such a rate as would secure final results in ten years, the annual appropriation required therefor would be $24,000. There is, however, one other item of expense which should be provided for, namely, the correct fixing and marking of town and county lines. Under the statutes and rules governing the action of the United States engineer officers, as well under our own laws, they can not attempt to locate and fix these lines, and as a consequence they are merely picked up from hearsay evidence on the ground and become erroneously located on the maps. An additional sum of four or five thousand dollars annually should be given to the State Engineer and Surveyor in order to enable him to fix and define these lines in advance of the other surveying parties.

I need hardly enlarge upon the value of the proposed work; its importance can be scarcely overestimated. It would, in the first place, add largely to our fund of geographical knowledge concerning our territory and thus be a benefit to all of our citizens. It would allow the approximate determination and location of projected railroad lines without the expense of preliminary surveys, and would forever prevent the waste of money upon impracticable railroad schemes, would make it possible for cities and villages interested in questions of water supply and sewerage to economically and expeditiously decide upon preliminary plans, and would in many other ways be productive of public and private benefit. Whether the State co-operates with the United States or not in this work, it is probable that it will still go on, but if the national government is left to do it unaided it will be fully fifty years before final results are obtained.

The States of New Jersey, Connecticut and Massachusetts have adopted this policy of co-operation, and the maps of these three States are now nearly, if not entirely, completed; and I believe it is the unanimous opinion of the officers and citizens of these States that the investment has been a profitable one.

I would respectfully call your attention to the remarks made on this subject by the Hon. Elnathan Sweet, late State Engineer and Surveyor, on page 13 of his report, for the year ending September 30, 1887. I will, in the near future, prepare a bill upon this subject and present the same to you for such action as you may deem wise in the premises.

COST OF CANALS.

Appended to this report will be found a table giving total cost of the canals system of this State (both of those canals which have been abandoned and those which are now in operation) from their inception to the present day, with a statement of the revenue which has been derived therefrom. In this table no consideration has been given to the item of interest paid on account of the various canal loans, or received on account of investments of canal funds, only the sums actually paid out for construction, improvements and maintenance, and received from tolls, water rents and sale of old material having been considered. This table conveys the gratifying information that, considered on the basis named above, the canals now in operation so far from being a source of loss to the State have produced a net profit of nearly $16,000,000, and this in spite of the fact that since 1882 the canals have been free and have produced no revenue except the very trifling sums received for water rents, sale of old materials, etc.; while taking into consideration the whole canal system, and charging expenses of those portions thereof which it has been deemed wise to abandon, the total net cost to the State (exclusive of interest as above stated) has been $2,936,478.56. In the preparation of these tables the figures given in the report of the auditor of the canal department for the year ending September 30, 1876, as cost and revenue of canal up to 1874 have been taken as correct, and all expenditures and receipts since October 1, 1874, added thereto. It is to be regretted that this report of 1876 embraces under one head the accounts of the Erie and Champlain canals. It would be a matter of public interest to compare separately the cost and revenue of these two canals, but on account of the immense labor involved and the uncertainty attending any attempt at this late day to make a division between them, I have been compelled to follow the precedent set in the report referred to.

ROAD IMPROVEMENT.

Few matters of public interest are receiving more attention at this time than that relating to the improvement of our common roads, and few are deserving of more consideration. Nothing can be expected, however, in the way of improvement until such legislation shall be enacted as will radically change the existing system of road construction and maintenance. To this end several bills were introduced in the last Legislature, but none of them were enacted into laws. As all of the proposed legislation connects this department with the subject of road improvement, it is deemed proper to call your attention to the somewhat startling fact that reliable estimates show that there is under the existing system of road maintenance enough money wasted each year to keep in excellent repair, under proper and intelligent supervision, all the roads of our State and have a large balance on hand for construction of new ones. This being the case, it is most earnestly recommended that the Legislature at its present session shall take such action as shall make the change and afford the desired relief. No good results can be obtained until this whole subject is placed under intelligent supervision. Whether this supervision should be intrusted to the engineering department of the State or confided in proper county officers is a question for legislative consideration and decision.

APPENDICES.

Appended to this report will be found:

1. Tables showing engineering expenditures during the past year.
2. Tables showing contract work which has been finished and finally settled for during the year, and of contracts now pending.
3. Tables showing cost of canals from their inception to the present time.
4. Reports from the division engineers of the Eastern, Middle and Western divisions and from the Assistant engineer in charge

of the Hudson river improvement, showing in detail the work done during the past year and making recommendations for future work, to all of which your attention is invited.

ORGANIZATION OF THE DEPARTMENT.

During the year it has been my good fortune to have had the able assistance of Chapman L. Johnson as Deputy State Engineer, a gentlemen whose long connection with the canals of our State and other professional abilities have enabled him to render his services of great value not only to the State Engineer, but to the State as well. The Division engineers at present employed are: John P. Kelly on the Eastern; Russel R. Stuart on the Middle, and John Bisgood on the Western Division.

The resident engineers are: Jay W. Clark on the Eastern; David E. Whitford on the Middle, and Alfred T. Jones on the Western Division, with the several subordinate employes whose names appear on the accompanying tables, each and all of whom it gives me pleasure to commend for the faithful and careful manner in which they have performed the several duties devolving upon them.

Respectfully submitted.

MARTIN SCHENCK,
State Engineer and Surveyor.

APPENDICES.

ENGINEERING EXPENSES FOR FISCAL YEAR.

ORDINARY REPAIR FUND.

Chapter 266, *Laws* 1890 *and Chapter* 129, *Laws* 1891.

DIVISION.	CANALS.				
	Erie.	Champlain.	Oswego.	Black River.	Cayuga and Seneca.
Eastern	$9,129 60	$3,154 68	....	....	....
Middle	7,383 35	....	$1,445 01	$1,375 99	$663 87
Western	8,876 24	....	....	....	....
	$25,389 19	$3,154 68	$1,445 01	$1,375 99	$663 87
Total	....	....	....	....	$32,028 74

EXTRAORDINARY CANAL IMPROVEMENT.

Eastern Division.

Lengthening locks, Erie canal, chapter 168, Laws of 1890,	$929 09
Improving Champlain canal, chapter 168, Laws of 1890,	2,282 86
Bottoming out Erie canal, chapter 168, Laws of 1890 ...	244 09
Dredging Albany basin, chapter 168, Laws of 1890.....	13 00
Repairing Moyer creek, chapter 113, Laws of 1891	1,040 96
Lift bridge, Nineteenth street, West Troy, chapter 239, Laws of 1891	402 04
Repairing Glens Falls feeder, chapter 271, Laws of 1891,	484 00
Little Falls dam, chapter 480, Laws of 1892............	858 62
Examination Troy and Cohoes dams, chapter 455, Laws of 1892	181 91

Surveys for State Board of Claims, chapter 302, Laws of 1891	$1,436 18	
Surveys for State Board of Claims, chapter 356, Laws of 1892	970 11	

Middle Division.

Surveys for State Board of Claims, chapter 295, Laws of 1890	62 92	
Surveys for State Board of Claims, chapter 356, Laws of 1892	2,558 74	
		$5,027 95
Improving sanitary condition old Erie at Rome, chapter 385, Laws of 1890		74 43
Swing bridge near Schuyler street, Utica, chapter 69, Laws of 1891		221 74
Culvert at West Utica, chapter 199, Laws of 1891		196 87
South Madison street bridge, Rome, chapter 601, Laws of 1892		122 10
Wall on Oswego canal, chapter 226, Laws of 1891		99 90
Cleaning reservoir, Forestport dam, chapter 342, Laws of 1891		1,299 95
Wall at Rome, Black River canal, chapter 271, Laws of 1892		51 68
Beaver dam at Stillwater, chapter 469, Laws of 1892		511 48
Dam at Forestport pond, chapter 494, Laws of 1892		1,142 00
Raising roads and bridges, Black river, chapter 494, Laws of 1892		367 76
Dredging Cayuga inlet, chapter 234, Laws of 1892		69 71
Sherburne embankment, chapter 249, Laws of 1892		445 40

Western Division.

Rowe street bridge, Rochester, chapter 138, Laws of 1891		772 21
Improving canal at Buffalo, chapter 476, Laws of 1892		965 06
Holly culvert, chapter 152, Laws of 1889 Holly culvert, chapter 221, Laws of 1891		136 97
Tonawanda bridge, chapter 82, Laws of 1891		756 97
Smith street culvert, Brockport, N. Y., chapter 238, Laws of 1891		224 62
Gordon mill culvert, Brockport, N. Y., chapter 238, Laws of 1891		266 58
Wall at Corning, N. Y., chapter 300, Laws of 1892		296 01

Dyke at Corning, N. Y., chapter 705, Laws of 1892	$272 06
Culvert, Adams Basin, N. Y., chapter 321, Laws of 1891,	711 74
Sewer and culvert, Medina, N. Y., chapter 298, Laws of 1891	756 08
Survey Chemung canal and feeder, chapter 435, Laws of 1892	1,368 65
Total	$22,494 52

SPECIAL APPROPRIATIONS.

Examination of monuments and maps, disbursed by division engineer, chapter 302, Laws 1891	$437 00	
Examination of monuments and maps, paid directly by State Treasurer, chapter 302, Laws 1891	3,621 15	
		$4,048 15
Hudson river improvement, paid directly by State Treasurer, chapter 204, Laws 1890...	$45 90	
Hudson river improvement, paid directly by State Treasurer, chapter 293, Laws 1892...	3,043 92	
Hudson river improvement, paid directly by State Treasurer, chapter 607, Laws 1892...	256 50	
		3,346 32
Channel between Shinnecock and Peconic bay, disbursed by division engineer, chapter 302, Laws 1891, and chapter 356, Laws 1892	$1,629 14	
		1,629 14
Total		$9,033 61

SUMMARY.

Ordinary repairs	$32,028 74
Extraordinary canal improvement	22,494 52
Special appropriations	9,033 61
Total engineering expenses	$63,556 87

The final accounts, twenty-two in number, passed in this office during the fiscal year ending September 30, 1892, have been:

	CHARACTER OF WORK.	Name of contractor.	Engineer's preliminary estimate.	Amount of final account.
1	Bridge, Moyer creek	J. H. Nelson	$1,300 00	$1,187 68
2	Forestport dam	P. McGuire	*61,705 00	89,505 07
3	Lock at Saranac lake	Milo B. Miller	5,300 00	4,500 00
4	Holly culvert	Albaugh & Beazer	1,560 50	1,550 77
5	Wall at Corning	J. Robinson	6,150 00	6,299 85
6	Substructure Tonawanda bridge	Albaugh & Beazer	17,809 00	18,200 08
7	Superstructure Tonawanda b'ge	Hilton Bridge Construct'n Co.	16,196 27	14,080 00
8	Moyer creek improvement	Brummelkamp & Conron	16,799 00	16,181 58
9	Contract 5, Champlain	Troy Public Works Co	21,497 00	20,337 37
10	Wall, Glens Falls feeder	The Drake-Stratton Co., Lim.	4,840 00	3,385 07
11	Rowe street bridge	Hilton Bridge Construct'n Co.	8,800 00	8,622 10
12	West Main street bridge, repairs.	Wm. B. Wemple's Sons	471 36	500 00
13	Medina sewer	Bauer, Buff & Pond	8,736 00	8,541 69
14	West Utica culvert	F. Louis Faas & Co	3,600 00	3,349 01
15	Schuyler street bridge, Utica	F. Louis Faas & Co	2,252 60	2,687 22
16	Adams Basin, culvert	Wm. Fuller	8,588 00	8,445 99
17	West Troy lift bridge, superstructure	Hilton Bridge Construct'n Co.	9,500 00	8,954 72
18	Smith street, culvert	Wm. Fuller	4,431 00	4,553 92
19	Substructure, West Troy bridge.	P. McKenna	2,989 25	2,964 64
20	Gordon Mill, culvert	Wm. Fuller	4,487 00	5,075 97
21	Schuyler street bridge, Utica, superstructure	W. H. Sheppard & Son	2,000 00	1,913 41
22	Dredging Shinnecock canal	P J. Brummelkamp	†13,731 00	†30,254 58
			$222,742 98	$211,090 67

* Work only partially completed under this contract. † Length of jetties and canal increased after award of contract.

TABLE of contracts pending on the New York State canals on the thirtieth day of September, 1892.

NAME OF CONTRACTOR.	Date of contract.	Character of work.	LEGISLATIVE ACT.		Appropriation.	Engineer's estimate.	Engineer's estimate at contract prices.	Payments to date.
			Chap.	Year.				
Beckwith & Quackenbush	July 26, 1892	Forestport dam	494	1892	$35,000 00	$30,815 00	$30,780 00	$1,700 00
Beckwith & Quackenbush	July 26, 1892	Raising roads and bridges at Forestport	494	1892	14,000 00	11,835 00	11,902 50	2,074 00
Beckwith & Quackenbush	July 26, 1892	Clearing Forestport flow grounds	342	1891	15,000 00	12,500 00	11,000 00	969 00
Albert J. Himes	Sept. 1, 1892	Corning dyke	705	1892	8,000 00	7,050 00	6,443 75	816 00
William Patrick	Aug. 31, 1892	Sherburne embankment	249	1892	10,000 00	8,137 50	7,442 00	969 00
F. Louis Faas & Co	Sept. 6, 1892	Dam across Beaver river at Stillwater	469	1892	15,500 00	13,600 00	13,220 00	662 00
P. J. Brummelkamp	July 25, 1892	Substructure of bridge at Shinnecock canal	356	1892	*10,000 00	4,584 00	4,624 00	2,142 00
Hilton Bridge Construc'n Co.	July 14, 1892	Superstructure of bridge at Shinnecock canal	356	1892		1,400 00	1,380 00	....
Rapp & Co	July 23, 1892	Little Falls dam	480	1892	15,000 00	12,395 00	9,694 00	3,247 00
W. H. Sheppard & Sons	Aug. 3, 1892	Rome bridge	601	1892	5,600 00	4,350 00	3,800 00	....
Totals						$106,666 50	$100,286 25	$12,579 00

* This appropriation is also applicable to the completion of the dredging and extension of breakwater.

In addition to the above, plans and estimates have been prepared and contracts for the same will shortly be let for the following pieces of work, authorized by the Legislature of 1892: Building wall at Stanwix street, Rome; building lift bridge at Salina street, Syracuse; building culvert at Cooley's Basin; building vertical wall at Schenectady; deepening canal through city of Buffalo. All of the above pieces of work will be fully completed within the amount of the appropriation except the last two, and on these the work will be prosecuted as far as available funds will allow.

TABLE showing total cost for construction, maintenance and operation of the several abandoned canals of the State and their total revenues, with their loss and gain, from their inception to September 30, 1892.

NAME OF CANAL.	Total cost of construction.	Total cost of maintenance and operation.	Total cost.	Total revenue from all sources.	Loss.
Crooked Lake	$395,091 54	$424,658 44	$819,749 98	$45,490 41	$774,259 57
Chenango	4,807,952 20	2,105,217 06	6,913,169 26	744,027 11	6,169,142 15
Chemung	1,512,041 15	2,022,258 99	3,534,300 14	525,565 29	3,008,734 85
Genesee Valley	6,741,839 23	2,814,808 67	9,556,647 90	860,164 78	8,696,483 12
	$13,456,924 12	$7,366,943 16	$20,823,867 28	$2,175,247 59	$18,648,619 69
Total loss					$18,648,619 69

TABLE showing total cost for construction, maintenance and operation of the several canals in operation in the State, and their total revenues, with their loss and gain, from their inception to September 30, 1892.

NAME OF CANAL.	Total cost of construction.	Total cost of maintenance and operation.	Total cost.	Total revenue from all sources.	Loss.	Gain.
Erie and Champlain	$57,688,676 49	$41,582,758 70	$99,271,435 19	$128,191,068 35	....	$28,919,633 16
Oswego	4,643,981 64	3,736,675 83	8,380,657 47	3,715,566 66	$4,665,090 81	....
Cayuga and Seneca	1,886,661 57	1,157,753 98	3,044,415 55	1,055,015 23	1,989,400 32	....
Black River	4,077,881 97	2,082,250 77	6,160,132 74	305,662 59	5,854,470 15	....
Oneida river improvement	233,961 82	41,235 82	275,197 64	214,427 52	60,770 12	....
Oneida lake	513,430 26	144,060 60	657,490 86	55,180 51	602,310 35	....
Baldwinsville (so called)	31,000 52	18,088 58	49,089 10	1,311 42	47,777 68	....
Seneca river towing path *	1,602 65	19 54	1,622 19	7,782 07	....	6,159 88
Cayuga inlet *	2,020 00	948 16	2,968 16	7,584 63	....	4,616 47
	$48,763,741 98	$69,079,165 92	$117,842,907 90	$133,555,049 08	$13,269,778 38	$28,981,919 51

Total gain	$28,981,919 51
Total loss	13,269,778 38
Net gain	$15,712,141 13

* No account has been kept of the original cost of these improvements.

TABLE showing total cost for construction, maintenance and operation of the several canals in operation in the State, and their total revenues, with their loss and gain, from their inception to September 30, 1892.

ERIE AND CHAMPLAIN CANAL.

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$52,283,257 79 147,383 23	$28,508,371 48	$80,934,012 50	$119,144,081 51	....	....
1875	953,729 44	1,095,301 57	2,049,031 01	1,836,531 95	....	....
1876	441,410 23	976,789 33	1,418,199 56	1,414,649 48	....	....
1877	220,374 03	831,688 71	1,052,062 74	985,724 58	....	....
1878	80,184 01	609,259 37	689,443 38	945,531 01	....	....
1879	134,542 33	644,484 93	779,027 26	896,418 02	....	....
1880	44,067 15	770,577 37	814,644 52	1,171,927 50	....	....
1881	14,833 28	971,196 42	986,029 70	790,809 74	....	....
1882	57,702 86	561,614 34	619,317 20	630,149 68	....	....
1883	19,739 04	571,281 90	591,020 94	270,407 79	....	....
1884	62,870 72	668,272 35	731,143 07	14,858 94	....	....
1885	230,507 04	620,293 54	850,800 58	12,496 44	....	....
1886	84,462 16	654,528 64	738,990 80	5,544 17	....	....
1887	285,460 10	657,513 68	942,973 78	13,425 05	....	....
1888	584,670 68	672,832 00	1,257,502 68	6,443 55	....	....
1889	589,241 19	671,528 90	1,260,770 09	15,477 82	....	....
1890	645,508 63	754,381 33	1,399,889 96	19,683 04	....	....
1891	536,177 62	676,426 57	1,212,604 19	7,955 91	....	....
1892	272,554 96	671,416 27	943,971 23	8,950 17	....	....
Total	$57,688,676 49	$41,582,758 70	$99,271,435 19	$128,191,068 35	....	$28,919,633 16

OSWEGO CANAL.

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$4,218,173 02	$2,985,770 66	$7,203,943 68	$3,545,525 53	....	....
1875	10,911 41	107,931 63	118,843 04	48,559 62	....	....
1876	35,717 88	56,223 52	91,941 40	29,048 35	....	....
1877	15,445 05	45,549 24	60,994 29	20,473 40	....	....
1878	15,125 20	33,489 38	48,614 58	12,731 89	....	....
1879	....	29,118 45	29,118 45	9,377 11	....	....
1880	....	37,877 00	37,887 00	14,388 45	....	....
1881	....	43,613 76	43,613 76	13,745 16	....	....
1882	....	31,872 50	31,872 50	14,698 23	....	....
1883	....	29,849 94	29,849 94	7,018 91	....	....
1884	....	35,492 65	35,492 65	....	....	....
1885	446 93	34,441 82	34,888 75	....	....	....
1886	801 45	37,737 45	38,538 90	....	....	....
1887	52,777 00	37,446 60	90,223 60	....	....	....
1888	60,998 71	33,033 16	94,031 87	....	....	....
1889	62,175 14	44,706 64	106,881 78	....	....	....
1890	75,152 59	39,031 78	114,184 37	....	....	....
1891	69,735 24	38,679 80	108,415 04	....	....	....
1892	26,462 02	34,809 85	61,271 87	....	....	....
Total	$4,643,921 64	$3,736,675 83	$8,380,597 47	$3,716,566 65	$4,665,030 82	....

BLACK RIVER CANAL.

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$3,826,423 89	$1,169,430 71	$4,995,854 60	$206,534 90		
1875	55,619 79	45,880 67	101,500 46	7,219 64		
1876	3,105 55	35,074 13	38,179 68	11,339 28		
1877	158 99	54,222 24	54,381 23	15,711 00		
1878	332 08	36,727 41	37,059 49	12,906 52		
1879		42,579 09	42,579 09	10,306 10		
1880		51,392 55	51,392 55	11,799 67		
1881	9,248 35	71,789 15	81,037 50	12,052 47		
1882	63 74	45,134 01	45,197 75	13,229 05		
1883	225 28	49,183 38	49,408 66	4,563 96		
1884	1,066 40	51,467 20	52,533 60			
1885	21,252 18	47,556 32	68,808 50			
1886	5,207 16	49,679 04	54,886 20			
1887	4,509 49	54,520 97	59,030 46			
1888	15,095 29	52,216 14	67,311 43			
1889	22,104 64	56,876 82	78,981 46			
1890	43,586 54	60,941 39	104,527 93			
1891	45,237 92	51,659 37	96,897 29			
1892	24,644 65	55,920 18	80,564 86			
Total	$4,077,881 97	$2,082,250 77	$6,160,132 74	$305,662 59	$5,854,470 15	

CAYUGA AND SENECA CANAL.

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$1,778,435 47	$888,532 14	$2,666,967 61	$1,014,008 69		
1875	25,982 40	30,155 03	56,137 43	13,616 07		
1876	675 13	25,396 33	26,071 46	11,063 99		
1877		19,307 97	19,307 97	6,632 80		
1878	24,803 03	14,730 38	39,533 41	8,354 77		
1879		11,503 11	11,503 11	1,998 21		
1880		11,753 45	11,753 45	1,462 57		
1881		14,963 26	14,963 26	1,095 27		
1882	4,288 37	11,196 90	15,485 27	1,108 59		
1883		11,395 97	11,395 97	659 27		
1884	1,512 85	10,572 85	12,085 70			
1885	1,422 73	14,485 77	15,908 50			
1886		11,511 29	11,511 29			
1887		17,687 92	17,687 92			
1888	3,431 14	13,889 09	17,320 23			
1889	21,389 74	11,223 37	32,613 11			
1890	21,038 83	13,572 54	34,611 37			
1891	3,681 88	14,902 55	18,584 43			
1892		10,974 06	10,974 06			
Total	$1,886 661 57	$1,157,753 98	$3,044,155 55	$1,055,015 23	$1,989,400 32	

ONEIDA LAKE CANAL.

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$451,015 20	$138,125 63	$589,140 83	$65,180 51		
1875	21,348 55		21,348 55			
1876	13,609 87		13,609 87			
1877	22,291 97		22,291 97			
1878	3,383 77	1,583 60	4,967 37			
1879		3,921 05	3,921 05			
1880		430 32	430 32			
1881						
1882						
1883						
1884						
1885						
1886						
1887	359 75		359 75			
1888	139 60		139 60			
1889						
1890	1,001 55		1,001 55			
1891	289 00		289 00			
1892						
Total	$513,439 26	$144,066 66	$657,499 86	$65,180 51	$592,319 35	

* SENECA RIVER TOWING PATH.

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$1,602 65	$19 54	$1,621 19	$7,235 38		
1875				89 72		
1876				68 88		
1878				186 92		
1879				57 41		
1880				39 48		
1881				31 37		
1882				32 54		
1883				28 40		
1884				11 97		
1885						
1886						
1887						
1888						
1889						
Total	$1,602 65	$19 54	$1,621 19	$7,782 07		$6,159 88
* BALDWINSVILLE CANAL.						
1874	$31,000 52	$18,088 58	$49,089 10	$1,261 48	$47,777 62	
CAYUGA INLET.						
1874	$2,020 00	$948 16	$2,968 16	$7,534 63		$4,536 47
* ONEIDA RIVER IMPROVEMENT.						
1874	$223,977 83	$41,170 47		$214,427 52		
1890	4,327 82					
1891	5,656 17					
1892						
Total	$233,961 82	$41,170 47	$275,132 29	$214,427 52	$60,704 77	

---

* Expenditures and revenues accruing on the Seneca river towing path, Baldwinsville canal and Oneida river improvement, not appearing in above tables, have been carried into account with Oswego canal.

CROOKED LAKE CANAL (*abandoned in pursuance of chapter* 404, *Laws of* 1877).

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$394,934 73	$414,639 04	$809,573 77	$45,196 14		
1875		7,710 15	7,710 15	127 79		
1876		1,592 89	1,592 89	30 48		
1877				36 00		
1878		716 36	716 36	100 00		
1879						
1880						
1881	156 81		156 81			
1882						
1883						
1884						
1885						
1886						
1887						
1888						
1889						
1890						
1891						
1892						
Total	$395,091 54	$424,658 44	$819,749 98	$45,490 41	$774,259 57	

CHENANGO CANAL (*abandoned in pursuance of chapter* 404, *Laws of* 1877).

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$4,766,014 37	$2,013,942 05	$6,779,956 42	$733,551 98	....	....
1875	9,052 90	26,121 52	35,174 42	5,126 98	....	....
1876	1,921 76	8,319 41	10,241 17	3,717 38	....	....
1877	4,919 23	7,722 88	12,642 11	1,159 18	....	....
1878	4,787 29	2,981 24	7,768 53	221 51	....	....
1879	642 62	8,940 45	9,583 07	61 88	....	....
1880	1,341 35	6,282 59	7,623 94	....	....	....
1881	791 15	4,345 04	5,136 19	....	....	....
1882	....	3,083 67	3,083 67	188 30	....	....
1883	707 48	2,717 07	3,424 55	....	....	....
1884	....	4,324 20	4,324 20	....	....	....
1885	11,234 84	3,683 77	14,918 61	....	....	....
1886	1,228 33	4,377 23	5,605 56	....	....	....
1887	404 71	1,706 39	2,111 10	....	....	....
1888	....	1,426 23	1,426 23	....	....	....
1889	1,300 00	1,922 13	3,222 13	....	....	....
1890	163 01	1,220 02	1,383 03	....	....	....
1891	....	971 42	971 42	....	....	....
1892	3,443 16	1,129 75	4,572 91	....	....	....
Total	$4,807,952 20	$2,105,217 06	$6,913,169 26	$744,027 11	$6,169,142 15	....

CHEMUNG CANAL (*abandoned in pursuance of chapter* 404, *Laws of* 1877).

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$1,401,904 03	$1,938,635 20	$3,340,539 23	$514,971 61	....	....
1875	14,411 49	25,778 20	40,189 69	1,732 32	....	....
1876	7,976 21	9,794 71	17,770 92	2,104 84	....	....
1877	....	21,706 45	21,706 45	3,211 64	....	....
1878	34,982 67	9,110 16	44,092 83	2,678 55	....	....
1879	3,787 70	4,887 41	8,675 11	742 01	....	....
1880	....	6,243 39	6,243 39	124 32	....	....
1881	....	6,103 47	6,103 47	....	....	....
1882	523 47	....	523 47	....	....	....
1883	....	....	....	....	....	....
1884	....	....	....	....	....	....
1885	1,017 10	....	1,017 10	....	....	....
1886	953 43	....	953 43	....	....	....
1887	3,650 00	....	3,650 00	....	....	....
1888	....	....	....	....	....	....
1889	4,024 56	....	4,024 56	....	....	....
1890	15,203 03	....	15,203 03	....	....	....
1891	8,407 36	....	8,407 36	....	....	....
1892	15,200 10	....	15,200 10	....	....	....
Total	$1,512,041 15	$2,022,258 99	$3,534,300 14	$525,565 29	$3,008,734 85	....

GENESEE VALLEY CANAL (*abandoned in pursuance of chapter* 404, *Laws of* 1877).

YEAR.	Construction.	Maintenance.	Total cost.	Revenue.	Loss.	Gain.
To 1874	$6,6 8,147 24	$2,562,472 09	$9,260,619 33	$801,468 00	....	....
1875	25,040 14	100,191 26	125,231 40	12,406 26	....	....
1876	7,941 93	23,264 10	31,206 03	14,668 50	....	....
1877	4,624 53	70,048 97	74,673 50	19,533 79	....	....
1878	....	31,099 03	31,099 03	9,954 24	....	....
1879	380 78	6,417 16	6,797 94	2,064 84	....	....
1880	1,051 79	17,410 38	18,462 17	62 50	....	....
1881	....	3,342 56	3,342 56	....	....	....
1882	224 15	563 12	787 27	6 65	....	....
1883	362 75	....	362 75	....	....	....
1884	103 03	....	103 03	....	....	....
1885	....	....	....	....	....	....
1886	497 89	....	497 89	....	....	....
1887	....	....	....	....	....	....
1888	655 00	....	655 00	....	....	....
1889	2,250 00	....	2,250 00	....	....	....
1890	....	....	....	....	....	....
1891	550 00	....	550 00	....	....	....
1892	....	....	....	....	....	....
Total	$6,741,889 23	$2,814,808 67	$9,556 647 90	$860,164,78	$8,696,488 12	....

SUMMARY.

NAME OF CANAL.	Total cost of construction.	Total cost of maintenance and operation.	Total cost.	Total revenue from all sources.	Loss.	Gain.
Erie and Champlain	$57,688,676 49	$41,582,758 70	$99,271,435 19	$128,191,068 35	....	$28,919,633 16
Oswego	4,643,921 64	3,736,675 83	8,380,597 47	3,715,566 65	$4,665,030 82	....
Cayuga and Seneca	1,886,661 57	1,157,753 98	3,044,415 55	1,055,015 23	1,989,400 32	....
Black River	4,077,881 97	2,082,250 77	6,160,132 74	305,662 59	5,854,470 15	....
Oneida river improvement	233,961 82	41,235 82	275,197 64	214,427 52	60,770 12	....
Oneida lake	513,439 26	144,060 60	657,499 86	65,180 51	592,319 35	....
Baldwinsville (so called)	31,000 52	18,038 58	49,039 10	1,261 48	47,777 62	....
Seneca river towing path *	1,602 65	19 54	1,622 19	7,782 07	....	6,159 88
Cayuga inlet *	2,020 00	948 16	2,968 16	7,534 63	....	4,566 47
	$69,079,165 92	$48,763,741 98	$117,842,907 90	$133,555,049 03	$13,209,768 38	$28,921,919 51
Total gain						$28,921,919 51
Total loss						13,209,768 38
Net gain						$15,712,141 13

---

* No account has been kept of the original cost of these improvements.

NOTE.—In preparing above tables, summaries contained in the report of the Auditor of the Canal Department, submitted to the Legislature January 11, 1876 (Assembly Doc. No. 4, 1876), showing cost of construction and maintenance of the several canals, with revenues derived from same, up to September 30, 1874, have been used and figures collated from the subsequent annual reports of the Auditor and Comptroller, giving expenditures and receipts for each year since said date up to September 30, 1892. No consideration has been given in these tables to the items of interest paid on canal loans or received from invested canal funds.

REPORT

OF THE

DIVISION ENGINEER

OF THE

EASTERN DIVISION

FOR THE

YEAR ENDING SEPTEMBER 30, 1892.

REPORT.

ALBANY, N. Y., *October* 1, 1892.

Hon. MARTIN SCHENCK, *State Engineer and Surveyor:*

SIR.— I have the honor to submit the following report on the Eastern Division of the New York State canals for the fiscal year ending September 30, 1892.

Description of the Eastern Division.

This division embraces that portion of the Erie canal, with its feeders and side-cuts, extending from the Hudson river at Albany to the dividing line between the counties of Herkimer and Oneida, and the whole of the Champlain canal, with its feeders, ponds and side-cuts. For convenience of maintenance and operation it is subdivided into repair sections, as follows:

Section No. 1, Erie, extends from the Hudson river to the head of lower Mohawk aqueduct, including the Albany basin and the side-cuts at Port Schuyler and West Troy, and also includes that portion of the Champlain canal extending from its junction with the Erie to the northerly end of bridge across the Mohawk river at Cohoes and the dam at Cohoes.

Section No. 2, Erie, extends from the head of lower Mohawk aqueduct to the head of Lock No. 27.

Section No. 3, Erie, extends from the head of Lock No. 27 to the head of Lock No. 34.

Section No. 4, Erie, extends from the head of Lock No. 34 to the westerly end of the division.

Section No. 1, Champlain, extends from the northerly end of Mohawk river bridge at Cohoes, to the north end of bridge across the Hudson river at Northumberland, including sloop-lock and pond at Troy.

Section No. 2, Champlain, extends from the north end of bridge across the Hudson river at Northumberland, to the waste-weir at Dunham's Basin.

Section No. 3, Champlain, extends from the waste-weir at Dunham's Basin to Lake Champlain.

The mileage of canals, feeders and river improvements is as follows:

Navigable.

	Miles.
Erie canal, Albany to east line of Oneida county	106.243
Port Schuyler and West Troy side-cuts	.350
Albany basin	.770
Champlain canal, including Waterford side-cut and Cohoes and Saratoga dams	66.000
Pond above Troy dam	3.000
Glens Falls feeder and pond	12.000
Total	188.363

Feeders not Navigable.

	Miles.
Mohawk river, at Rexford Flats	.39
Mohawk river, south side, at Little Falls	.19
Mohawk river, at Rocky Rift	3.92
Schoharie creek	.63
Total	5.13

Erie Canal — Water Supply.

The Erie canal upon this division is supplied with water from the following sources:

That portion of this division west of Little Falls is supplied from reservoirs and streams on the Middle Division, through the Rome level; at Little Falls the supply is through the feeder from the Mohawk river, entering the canal through the towpath, about sixty feet below Lock No. 39.

Near Mindenville the supply is through Rocky Rift feeder from the Mohawk river, discharging into the canal through the tow path, 400 feet below Lock No. 34.

Near Fort Hunter the supply is from Schoharie creek, discharging into the canal on the berme side about 400 feet below Lock No. 29.

At Rexford Flats the supply is from the Mohawk river, entering the canal through the towpath, about 120 feet below Lock No. 21.

The water supply on this division of the Erie canal has been uniformly good, and the levels kept fully up to their proper elevation.

CHAMPLAIN CANAL WATER SUPPLY.

The water supply of the Champlain canal is principally from the Hudson river through the Glens Falls feeder, discharging into the summit level of the Champlain canal, supplying the canal from Northumberland to Whitehall, being supplemented on the north by waters of Wood Creek. Also from Northumberland to the first lock north of Waterford, the supply is from the Hudson river entering the canal at Northumberland, and from the first lock north of Waterford to its junction with the Erie canal, including the Waterford side-cut, the supply is from the Mohawk river entering the canal at Cohoes and at its junction with the Erie canal through the Erie canal from Rexford Flats. The water supply on this canal during the past year has been ample.

ERIE CANAL.

Banks, prisms, docking, etc.

The towpath has been raised in places where it was low, and has been placed in good condition by graveling where necessary. Bars have been removed from various portions of the prism, and a considerable amount of bottoming out has been done between Lock No. 18 and the lower Mohawk aqueduct.

Docking has been repaired and rebuilt at several points along the canal, but there is still a great deal of it which needs renewing.

Repairs have also been made to vertical and slope walls where possible with the small amount of money available for that purpose. The vertical wall through the city of Cohoes is in very poor condition and needs renewal. Also some of the vertical wall on the berme side of the canal near Ilion is in poor condition, as well as at other places.

The high bank on the berme side of the canal just west of Schenectady is still protected only by the partially decayed plank docking built there some thirty-seven years ago, excepting 2,340 feet where the plank docking has been replaced by a stone wall laid in cement. The last legislature appropriated $20,000 for protecting and strengthening this bank, which amount will be expended during the coming winter in continuing the stone wall built in 1889 and 1890. This will leave about 4,300 feet of the bank still poorly protected. The stone wall should be extended along the entire length of this embankment, for which further appropriations should be made.

About 9,000 feet of the opposite or towing-path bank have a similar protection of decaying plank docking, which should be replaced by a substantial stone wall.

The docking on towing-path side of canal at Big Nose is in very poor condition, and should be rebuilt. Attention has been called to this docking in several preceding reports from this office.

Locks.

Fifty-two new lock-gates have been inserted during the year, and twenty-six new balance-beams.

The bottom of locks Nos. 7, 8, 10, 11, 13, 14 and 17 were partially replanked, and holes were filled with crushed stone and grouted, to stop the leaks. Several lock-walls were pointed, and repairs were made to miter-sills. New timber pier filled with stone was built at foot of lock No. 39.

The bottom of locks Nos. 7, 11, 13, 14, 16, 19, 22, 25 and 27 should be thoroughly repaired by renewing all the planking, and filling the spaces between foundation timbers with concrete, both in the old lock chambers and in the culverts between the lock chambers.

These lock and culvert bottoms allow the water to leak from one lock chamber to the other, or from the lock chambers to the culvert between them.

Nearly all the lock walls should have the joints cleaned out, and thoroughly caulked and pointed with Portland cement.

The stone-filled timber piers at locks Nos. 2, 25, 26, 27, 30 31, 32, 33, 34 and 36 need rebuilding.

The culvert between the two chambers of lock No. 24 is falling in, and needs repairing.

Puddle is required back of lock walls on pier between lock chambers at lock No. 13, and back of lock wall on towing-path side of lock No. 32, to shut off leaks. At lock No. 23, the lower part of walls in upper chamber on berme side require dressing back, as boats bind here.

At the West Troy side-cut locks, the retaining wall on towing-path side requires repairing.

At several of the locks new gates are required, and some of the gates should have the upper part of toe-posts trimmed to allow the gates to close tightly and prevent leakage. Also, a few of the miter-sills need repairing to prevent leakage.

The coping stones on several of the lock walls, especially the hollow quoin coping stones, are badly disintegrated, and should be renewed.

Culverts.

The culverts, generally, are in fair condition, although some of them require slight repairs, especially to the wings. The culvert between locks Nos. 6 and 7 needs new plank in bottom. The culvert that carries the feeder under the canal at the upper Mohawk aqueduct requires repairs to the upper spandril wall. The culvert carrying the Rocky Rift feeder under Castle creek requires repairs to masonry and to paving in creek bed. The first culvert west of lock No. 41 should be rebuilt. It is in very bad condition.

All the culverts should be cleaned out. Some of them are completely choked with gravel.

Waste-weirs.

Waste-weir No. 2 at the West Troy basin has been repaired and is now in good condition.

The waste-weir near the dry dock at West Troy has also been repaired, the wood work having been renewed throughout. Waste-weir No. 4, between locks No. 9 and 10, has been strengthened, but the masonry should be rebuilt at once.

Waste weir No. 6, west of lock No. 20 is not now in use. It should be rebuilt and made serviceable.

No. 7, just west of Rotterdam street, Schenectady, has not been in condition to use for some years. It is the only one on this seven-mile level and should be rebuilt.

No. 14, between locks Nos. 36 and 37, is in poor condition. The timbers are badly rotted. It should be rebuilt farther west, as it is too near the head of lock No. 36.

No. 15, west of lock No. 39, needs repairs.

No. 16, between locks Nos. 40 and 41, and No. 17 between locks Nos. 41 and 42 are in bad condition and should be rebuilt. The towing-path near waste-weir No. 16 is low and should be raised. The gate masonry at head of Schoharie creek feeder needs repairing. The masonry of all the waste-weirs should be pointed with Portland cement.

Aqueducts.

The masonry of the lower Mohawk aqueduct is in pretty good condition, except that it needs pointing. The timber ofthis aqueduct should be almost entirely renewed at once as it is in a very dangerous condition. Some few of the timbers have been renewed during the past year. The masonry of the upper Mohawk aqueduct needs considerable repairing on the upstream side; some of the timber protection on ice breakers has been torn off and the exposed masonry badly damaged by ice The masonry should be repaired and protected by new timbers. The timber trunk of this aqueduct is also badly rotted and liable to fail at any time thus causing a long delay to navigation. It should be almost entirely renewed.

The Schoharie creek aqueduct is in need of very extensive repairs. Five of the stone piers have settled bodily about eight inches, and one other pier has settled about two inches. This settlement, while indicating insufficient foundation, also allows the timber trunk to settle, opening the timber joints or breaking the timbers, and causing wasteful leaks. The foundations of the piers should be examined and strengthened and the tops of the piers raised to their proper height. New timber protection is needed for the ice breakers, and some of the coping stones of the parapet on the towing-path side have been broken and should be replaced. The timber trunk of this aqueduct is so badly decayed that it is very dangerous and should be entirely renewed without delay.

Flatstone creek aqueduct, which was carried away by the break of July 21, 1891, and rebuilt with stone-filled timber cribs, is in good condition, and will probably so remain until the timbers begin to decay.

The aqueduct at Sprakers needs new timber trunk and the gravel that has collected in the creek bed under the aqueduct should be cleaned out. It fills nearly the entire water way.

The Canajoharie aqueduct needs new timber trunk and the creek bed under it requires cleaning out.

The Fort Plain aqueduct requires repairs to timber trunk; the foundations of the piers and east abutments have been partially undermined and have settled so much that one of the piers will have to be entirely rebuilt, and the other three piers and the east abutment should be partially rebuilt, and the foundations will have to be strenthened.

The one-span aqueduct just west of lock No. 40 should have the masonry wings on the berme side rebuilt.

The other aqueducts are in fair condition, but the masonry of all of them should be repointed.

Ordinary, and in some cases extensive repairs have been made to most of the aqueducts on this division during the year, but the bad condition of many of them requires repairs and renewals so extensive that they can only be made from special appropriations for the purpose.

Each of the three preceding annual reports issued from this office has directed attention to this matter, and I would recommend that an appropriation of $150,000 be requested for rebuilding or repairing aqueducts on this division.

Dams.

There are four dams on this division.

Dam No. 1. Located at Rexford Flats, across the Mohawk river. This dam is in good condition with the exception of the apron, more than one-half of which has been carried away and should be replaced.

Dam No. 2. Located at Fort Hunter, across Schoharie creek. A portion of the apron has been carried away, and the dam itself leaks badly, rendering the Schoharie creek feeder almost useless. The dam should be overhauled and repaired and made tight by filling and planking and new apron should be built.

Dam No. 3. Located five miles east of Little Falls across the Mohawk river and known as the Rocky Rift feeder dam.

Dam No. 4. Located at Little Fall, across the Mohawk river. Act Chapter 480, Laws of 1892 appropriated $15,000 for building a new stone dam here to take the place of the old timber structure. The contract for building the stone dam was awaward to Rapp & Co., of Canajoharie and the dam is now being constructed. When completed it will be a great improvement, giving a more certain supply of water to that portion of the canal fed by it. Lift-gates, to resist pressure from either side should be substituted for the present miter gates at the head of the feeder, in order that the water may not flow from the canal through the feeder into the river at times when the level of the river water surface is below that of the canal.

Bridges and bridge abutments.

During the year bridges Nos. 18, 52, 107 and 166 were rebuilt, also bridge at West Troy lower basin.

Repairs were made to swing-bridge at West Troy upper basin, and to bridges Nos. 30, 31, 32, 41, 43, 44, 47, 48. Bridges Nos. 5, 6, 10, 45, 55, 69, 95, 96, 97, 106, 120, 127, 136 and 163, towing-path bridge over feeder near lock No. 21, and bridges Nos. 3 and 4 on Rocky Rift feeder should be rebuilt at once.

Abutments of swing-bridge at West Troy upper basin, berme abutments of bridges Nos. 74, 142 and 149, and south abutment of bridge No. 9 on Rocky Rift feeder need rebuilding.

Increasing traffic requires a stronger superstructure for bridge No. 10.

Bridge No. 136 is on Ann (or Bridge) street in the village of Little Falls, and carries the greater part of the traffic to and from the West Shore R. R. depot. The present structure, which is a cast iron arch bridge, is in very poor condition and altogether too lightly bullt to meet the present requirements. It should be replaced by a more substantial wrought-iron bridge.

Repairs are needed to bridges Nos. 9, 30, 31, 32, 41, 44, 46, 48, 126 and 129; and to the berme abutments of bridges Nos. 35, 72, 77, 117, 119, 132 and 145, and to the east abutment of bridge No. 1 on the Rocky Rift feeder. Bridge No. 14 needs new floor. The berme abutment of bridges Nos. 39, 40, 42, 63, 112 and 169 lean towards the canal. They should be dug behind and under, and tipped back into position.

The abutments of the bridges generally should be repointed.

A lift-bridge was built during the year at Nineteenth street, West Troy, in place of the cast-iron arch bridge formerly there.

There are now four lift-bridges on this division on the Erie Canal and three on the Champlain Canal, one of which was built across the Champlain Canal at Mechanicsville by the Fitchburgh Railroad Company. Those on the Erie Canal are located, one at North Ferry street, Albany, one at Nineteenth street, West Troy, one at Church street, Schenectady, and one at Main street, Fort Plain. The cables carrying the floor system of these bridges are allowed to remain on the bridges during the winter season, subject to a constant tension and exposed to the action of rain, snow and freezing weather. As a consequence of this treatment, the cables soon become weakened by rust and by loosening and spreading of the strands composing them.

As a preservative measure I would suggest that all cables be removed from lift bridges at the close of navigation each year, well brushed to remove any rust that may have formed, oiled and laid away under shelter until the following spring. All the machinery of the lift bridges should also be well cleaned and oiled every spring.

Plans have been prepared for a lift-bridge over lock No. 1, Erie canal at Water street, Albany, under Chapter 394, Laws of 1892. The expense of building this bridge is to be borne by the city of Albany. The floor system is to consist of two parts, one over each chamber of the lock, and the motive power is to be obtained from the city water mains.

EXTRAORDINARY REPAIRS.

Repairs to Moyer Creek, Chapter 113 *Laws of* 1891.

This act appropriated $20,000 for the purpose of restoring and protecting the channel of Moyer Creek in the village of Frankfort.

The work done under this appropriation consisted of a substantial rubble wall built on a pile foundation, on each side of the creek from the first dam below the canal to a point just east of Main street, then a timber-crib dock on each side of the cut filled and backed with earth for a distance of about 250 feet. Below these cribs a stone dam was thrown across the channel of the creek with a sloping apron of timber and protected by a rubble wall at each end, all on a pile foundation. This work was done by Brummelkamp and Conron, contractors, of Syracuse, who also built some heavy slope wall on the east bank of the creek above the canal. An iron bridge was also built across the creek on Main street by John H. Nelson, contractor, of Herkimer.

The work done here has proved very effective, forming a pond and checking the current of the stream, thus preventing the destructive scouring action that a stream with such a rapid descent would otherwise have; but to obtain the best results the protective and controlling works should be continued to the crossing of the West Shore Railroad.

LIFT-BRIDGE AT NINETEENTH STREET, WEST TROY.

Chapter 239, *Laws of* 1891.

This act appropriated $14,000 for the purpose of removing the existing bridge and approaches and building a lift-bridge in place thereof at Nineteenth street, in the village of West Troy. The contract for the substructure was awarded to P. McKenna, contractor, of Troy, and the contract for the superstructure to the Hilton Bridge Construction Company, of Albany. The work has been completed, the motive power for operating the bridge being obtained from the village water-mains. The approaches are guarded by pneumatic gates independent of the bridge.

LIFT-BRIDGE AT WATER STREET, ALBANY.

Chapter 394, *Laws of* 1892.

This act provides for building a lift-bridge over lock No. 1, Erie Canal at Water Street, in the city of Albany, in place of the present bridge and approaches, at an expense not to exceed $12,000, which expense is to be borne by the city of Albany.

Plans for this work have been prepared and submitted to the State Engineer and Surveyor.

LITTLE FALLS DAM.

Chapter 480, *Laws of* 1892.

This act appropriates $15,000 for the building of a stone dam across the Mohawk river at Little Falls, to replace the present timber structure. The contract was awarded to Rapp & Co., contractors, of Canajoharie, and the construction of the dam is now under way.

STRENGTHENING AND PROTECTING BERME BANK AT SCHENECTADY.

Chapter 495, *Laws of* 1892.

This act appropriates $20,000 for strengthening and protecting the berme bank of the canal at Schenectady. Plans have been prepared for building a stone wall in continuation of the stone wall already built for 2,340 feet west from Rotterdam street.

WEST SHORE RAILROAD.

A short distance east of Mohawk, where the West Shore railroad crosses a wide water of the canal on a trestle known as the "Dugway Trestle," the New York Central and Hudson River Railroad Company, lessees of the New York, West Shore and Buffalo Railroad Company, in accordance with a permission granted by the Superintendent of Public Works on the 30th day of December, 1891, are replacing the trestle by an earth embankment. The highway, which passed twice under the railroad, now lies between the new embankment and the canal and is supported on the canal side by a row of piles with wale timbers and plank. The Railroad Company have deepened the portion of the wide water not occupied by these improvements and have also furnished an additional wide water a little further east.

BREACHES.

There was but one breach on this division of the Erie Canal during the year, and that was a very slight one. It occurred on the evening of August 2nd, when a portion of the towing path ten feet long and three feet deep, about two miles east of Amsterdam, was washed out, owing to the heavy rains. The level was partially drawn and repairs made in a few hours.

CHAMPLAIN CANAL.

Banks, prism, docking, etc.

During the past year graveling the banks and raising them where low has been continued, but more work of this kind will be required to put them all in good condition.

Bars have been removed from the prism at several points during the season of spring repairs, and some bad sink holes that were found in the bottom of the Glens Falls feeder were cleaned out and filled with concrete.

The greater portion of the prism of the Champlain canal where the depth has not been increased to six feet in the course of the extraordinary improvements, requires considerable cleaning out to attain the standard depth of five feet. New docking has been built during the year at various places; 300 lineal feet below the Waterford sidecut, 150 lineal feet between locks Nos. 8 and 9, 500 lineal feet between locks Nos. 9 and 10, 100 lineal feet between locks Nos. 14 and 15, 300 lineal feet between locks Nos. 15 and 16, and a small amount on the Glens Falls feeder; also, new dock has been built on piles around pier at east end of Troy dam. The docking on the towing path side of the canal, from lock No. 10 to the river bridge at Northumberland, and on the berme side of the canal from the same lock to the bulkhead at the end of the Saratoga dam, is in very bad condition and should be rebuilt.

Repairs have been made to slope walls and to vertical walls where they have fallen into the canal. The walls on both sides of the Waterford sidecut, just below locks, need rebuilding.

Locks.

During the year twenty-three new lock-gates have been placed in position and repairs made to many other gates; also, to miter sills in several of the locks. Piers have been rebuilt at locks Nos. 2, 4, 5, 11 and 12 on the Glens Falls feeder and at lock No. 15 on the Champlain canal. New gates are required at locks Nos. 2, 5, 6, 8, 13, 14 and 21, Champlain canal. Some of the lock walls have been repointed.

At lock No. 6 the walls have been forced in towards the center of the lock, causing the tops to assume curved lines and reducing the batter to almost nothing and making it difficult for boats to pass through the lock. The trouble is probably caused by leakage. The water leaks through the walls and back of them, and this water freezing in the winter time, both in the walls and behind them, would tend to disrupt the walls and throw them forward. The face of the walls should be cut back so as to be parallel to the center line of the lock, and far enough to allow boats to pass through the lock freely. To shut off the leaks the earth should be removed from the back of the walls and grout run into the walls and the space back of them filled with puddle. When the face of the walls has been cut back the joints should be caulked and pointed with Portland cement.

At lock No. 7 the walls are too low and timbers have been placed on the top of the towing path wall to prevent the water from overflowing. These walls should be raised by a course of stone. Puddling is required back of both walls to shut off leaks.

At lock No. 8 the walls of the sluice around the lock lean forward. They should be partly rebuilt.

At lock No. 9 there is a condition of affairs similar to that at lock No 6. Here the walls bulge in toward the centre of the lock chamber about eight feet below the top. The same treatment is recommended for this lock as for No. 6.

The timber in the bulkhead of the sluice around lock No. 9 needs renewal.

At lock No. 10 the timber in the bulkheads at head of sluices around the lock needs renewal.

At lock No. 11 there is a very bad leak around and through the lock wall on the berme side which should be cut off by grouting, puddling and sheet piling.

At locks Nos. 13 and 14 the timber under the tumble gates should be renewed. The lower wing walls of lock No. 14 need some repairs. The timber in bulkheads at head of sluices around locks Nos. 1, 4 and 13 on Glens Falls feeder, and timber sluices around lock No. 4 need renewal.

The timber in bulkhead at head of sluice around lock at head of Glens Falls feeder will require renewal in a year or two. A very substantial wall ot coursed masonry was built last winter to replace the dilapidated wall on the west side of this sluiceway.

The joints of all lock walls should be cleaned out, caulked and pointed with Portland cement.

CULVERTS.

The culverts on this canal are generally in fair condition. The first stone arch culvert below lock No. 13 should be rebuilt on the towing-path end, where it has fallen out of shape.

The wooden box culvert about 1,200 feet west of Glen street, Glens Falls, from prism of feeder through the towing-path, is badly decayed and should be rebuilt. Some of the culverts are partially filled with gravel, etc., that has collected in them, reducing the effective waterway. They should be kept clear.

WASTE-WEIRS AND SLUICEWAYS.

Repairs have been made to the waste-weirs and sluiceways during the year.

New timbers are needed in waste-weir in No. 1, just below lock No. 7.

Waste-weir No. 2, just below lock No. 8, should be rebuilt. The timbers are decayed and the masonry joints are open so as to allow the water to leak through.

Waste-weir No. 3, above Mechanicville, should be rebuilt. The masonry has been forced out of shape and is very leaky. It has been repeatedly repaired, but can be put in good condition only by rebuilding.

Lansing's waste weir, at Stillwater, needs extensive repairs. Waste weir at Bemis Heights requires new timbers.

The waste-weir near Wilbur's Basin is in very poor condition in timber, masonry and foundation. It should be rebuilt. New timber is required in waste-weir next south of bridge No. 50.

The masonry of waste-weir next below lock No. 10 is very leaky and needs attention. New timbers are required in waste-weir between locks Nos. 11 and 12, also in Moses Kill and Eastman's waste-weirs.

Dunham's basin waste-weir needs repairs to masonry and some new castings. Smith's basin waste-weir and the waste-weir on the Glens Falls feeder need rebuilding. Manville waste-weir is leaky. The masonry should be grouted and pointed. The masonry of all the waste-weirs should be repointed.

Aqueducts.

The timber trunk of the Fort Edward aqueduct is badly decayed and is so unsafe that it has to be propped up. It should be rebuilt at once.

The stone wall supporting the road that lies on the towing-path side of this aqueduct is not in a very good condition. It has been gradually forced out towards the foot, giving the face a curved section, with the top leaning in towards the road. It will be necessary to rebuild it within a few years.

The other aqueducts are in fair condition, but all the masonry requires pointing.

Dams.

The dam across the Hudson river at Troy is a stone-filled timber crib dam, with apron of similar construction. It is very leaky, many of the timbers are rotted and in some portions the stone filling has been washed out. It is not in very good condition and needs repairing.

The dam across the Mohawk river at Cohoes is a stone dam built on the rock bottom of the river. It is in a very dangerous condition, the face stones of the dam having been separated from the backing at several places and moved considerably out of place, greatly weakening the structure.

These two dams will be considered more fully in a report to be made in compliance with the provisions of chapter 155, Laws of 1892.

The stone dam on Wood creek, just south of lock No. 19, requires extensive repairs; the central pier on top of the dam, and portions of the two upper courses of stone have been carried away.

The two stone dams on Wood creek, south of lock No. 20, requires some repairs; the abutments and the piers on top of the dams are somewhat dilapidated.

The tree dam south of lock No. 20 on Wood creek requires repairs; a portion of the north abutment needs rebuilding, and some of the timbers in the dam have decayed and should be replaced by sound ones.

Bridges and Bridge Abutments.

Many of the bridges on this canal have been repaired during the year, and bridges Nos. 6, 11, 55, 68, 69, 70, 74, 107, 132 and 133, also bridges No. 3 and 10 on the Glens Falls feeder have been rebuilt.

These bridges need rebuilding: Nos. 3, 7, 19, 21, 32, 33, 47, 53, 54, 67, 92, 94, 95, 100, 102, 111, 112, 114, 116, 124, 125 and 135.

New abutments should be rebuilt as follows: Berme abutments of bridges Nos. 19, 46, 53, 103, 105 and 114. Towing-path abutment of bridges Nos. 35, 47, 72, 118 and 133. Both abutments of bridges Nos. 21, 76 and 119.

The following bridges need repairing: Nos. 43, 58, 87 and 97.

Abutments need repairing as follows:

Berme abutment of bridge No. 56.

Towing-path abutment of bridges Nos. 78, 89 and 137.

Both abutments of bridges Nos. 59 and 121.

On the Glens Falls feeder, bridges Nos. 4, 7 and 11 should be rebuilt. Bridge No. 11 is the wrought iron arch-bridge at Glen street, Glens Falls; it is too light for the traffic that passes over it, and should be replaced by a more substantial structure.

The berme abutment of bridge No. 3, and the towing-path abutment of bridge No. 7 needs rebuilding.

Bridge No. 5 requires repairs.

EXTRAORDINARY REPAIRS.

Improving 3,200 *feet of canal near Searles' waste-weir, Chapter* 168, *Laws of* 1890.

The contractors for this work were the Troy Public Works Company, Limited, of Troy. Under their contract they built an entirely new piece of canal for about 1,800 feet, cutting off several bends and removing the canal from the foot of a hill that had caused considerable trouble and expense by sliding partly into the canal and narrowing the waterway so that it was with difficulty that even a single boat could pass it. The new towing-path bank is protected by a slope wall. North of this, to Searles' waste-weir, a new timber dock has been built, about 1,400 feet long. For the whole distance of 3,200 feet the canal was enlarged to the standard width of forty-four feet on the bottom, with a depth of six feet below level of water surface.

WALL OF SLUICEWAY AT HEAD OF GLENS FALLS FEEDER.

Chapter 271, *Laws of* 1891.

A wall of coursed masonry, two-faced, and of large stones, was built here to replace the old rubble wall which was in such bad condition that it was in constant danger of falling, either into the sluiceway or into the pond on its other side, according as the water was drawn from the pond or the sluiceway, leaving the pressure on the opposite side. The work was done by Drake & Stratton Company (Limited) contractors.

BREACHES.

There were no breaches on the Champlain canal during the year, and but one on the Glens Falls feeder. On the morning of November 28, 1891, a little south of Sherman's lime kilns, about eighty feet of the towing-path bank was carried off, the breach extending down to the rock five feet below the bottom of the canal. The bank here is not protected by a slope or vertical wall or docking and rests on the shelving rock. As the breach occurred so near the close of navigation it was not repaired until the following April, when a timber crib dock was built, bolted to the rock front and rear and sheet piled and puddled in front. The bank was then built up with gravel and sand and has since shown no signs of weakness.

SHINNECOCK AND PECONIC CANAL.

Chapter 436, *Laws of* 1890; *Chapter* 302, *Laws of* 1891; *Chapter* 356, *Laws of* 1892.

P. J. Brummelkamp of Syracuse, has completed his contract for extending the jetties at the north end of the canal and for dredging the canal; the channel has been dredged to a width of forty feet on the bottom, with a depth of water of four and one-half feet at low tide, all the way from Peconic bay on the north to deep water in Shinnecock bay on the south, a distance of nearly a mile. Mr. Brummelkamp has also contracted to build the substructure and the Hilton Bridge Construction Company, of Albany, have contracted to build the superstructure of a swing bridge of iron to carry the highway across the canal. This work is now under way and will soon be completed. The substructure includes a stop-gate between the piers of the bridge which will allow the salt water to enter Shinnecock bay from Peconic bay at high tide, but will prevent the water from flowing back when the tide ebbs, thus avoiding the swift current that would otherwise obtain with the ebb and flow of the tides, and allowing boats to pass at high tide.

All the masonry structures on the canals, including locks, aqueducts, waste-weirs, culverts, sluices, bridge abutments, vertical walls, etc., should be examined every spring previous to the opening of navigation and repointed wherever the mortar has fallen from the joints or has been loosened.

A few years ago fishways were built at three dams on this division, all on the Hudson river, at Troy, at Mechanicville and at Northumberland; but they are not under the supervision of this department.

Much work has been done under the direction of the Attorney-General, from this office, making surveys and giving expert testimony in cases of claims for damages along the canals. Work has also been done from this office under the direction of the commissioner of the New Capitol.

The continuing necessity of making surveys and maps for the use of the Attorney-General and of giving expert testimony before the Board of Claims in defense of suits brought against the State, and the fact that only on rare occasions can members of the ordinary engineering corps be detailed to such work without neglecting equally important duties in other directions leads me to recommend that the Legislature be asked to repeat its action of last year and to make a special appropriation for this purpose, and also to repeat the recommendation heretofore made by both the State Engineer and Surveyor and the Superintendent of Public Works that some provision be made to secure the drainage of private property damaged by leakage from the canal, which will cut off, or at least largely reduce what is now a fruitful source of litigation against the State and a damage to its citizens.

It is to be regretted that a lack of appropriation has caused a suspension of the improvements that are being made on the canals, engthening the locks of the Erie canal and straightening, widening, and deepening the Champlain canal.

The widening and deepening that has already been done on the Champlain canal will not be productive of the full amount of benefit possible until the entire canal has been widened and deepened, as the load that boats can carry is governed by the dimensions of those portions of the canal that have the least depth of water.

If future appropriations are made for continuing the improvements of the Champlain canal I would recommend that the enlargement and other improvements be made continuous from the south end of the canal northerly.

This division has been under the charge of Chapman L. Johnson as division engineer from October 1, 1891 to December 31, 1891, and John P. Kelly as division engineer from Jannary 1, 1892 to September 30, 1892, with John P. Kelly as resident engineer from October 1, 1891, to December 31, 1891, and Jay W. Clark as resident engineer from January 15, 1892 to September 30, 1892.

A statement of the engineering expenses of this division is hereto annexed showing in detail the names of persons employed, time of service and compensation of each.

Yours respectfully.

JOHN P. KELLY,
Division Engineer.

Statement showing names, rank, number of days and compensation of engineers employed on the eastern division of the New York State canals, together with incidental expenses during the fiscal year ending September 30, 1892.

ORDINARY REPAIRS — ERIE CANAL.

Chapter 129, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
Chapman L. Johnson	Division engineer	....	$2,400 00 per annum.	$399 99	$109 78	$509 77	
John P. Kelly	Division engineer	....	2,400 00 per annum.	1,200 01	65 83	1,265 84	
John P. Kelly	Resident engineer	....	2,000 00 per annum.	309 51	20 00	329 51	
J. W. Clark	Resident engineer	....	2,000 00 per annum.	942 84	93 24	1,036 08	
T. C. Leutze	Assistant engineer in charge	65	6 00 per day	390 00	48 25	438 25	
George I. Bailey	Assistant engineer in charge	75½	6 00 per day	453 00	52 76	505 76	
T. C. Leutze	Assistant engineer	26	5 00 per day	130 00	77 88	207 88	
F. W. Battershall	Leveler	105	4 50 per day	472 50	6 20	478 70	
James Ryan, Jr.	Rodman	199	3 50 per day	696 50	97 67	794 17	
Edwin Styring	Rodman	43	3 50 per day	150 50	1 92	152 42	
C. H. Barber	Rodman	104	3 50 per day	364 00	7 28	371 28	
J. H. Jones	Rodman	14	3 50 per day	49 00	....	49 00	
C. M. Pepson	Rodman	102	3 50 per day	357 00	24 79	381 79	
T. A. Paterson	Rodman	21	3 50 per day	73 50	....	73 50	
William J. Smith	Rodman	50	3 50 per day	175 00	6 49	181 49	
J. C. Dougrey	Rodman	71	3 50 per day	248 50	30 36	278 86	
John J. Allen	Chainman	136	4 00 per day	544 00	....	544 00	
William Miller	Chainman	53	2 50 per day	132 50	9 15	141 65	
B. Frederick	Chainman	150	2 50 per day	375 00	30 72	405 72	
William E. Lutjens	Chainman	36	2 50 per day	90 00	....	90 00	
Wallace Greenalch	Chainman	4	2 50 per day	10 00	....	10 00	
Max L. Blum	Chainman	5	2 50 per day	12 50	....	12 50	
							$8,258 17
Incidental expenses.							
Livery						$72 00	
Postage and telegraph						135 69	
Labor						116 89	
Stationery						360 38	
Miscellaneous						186 47	
							871 43
							$9,129 60

ORDINARY REPAIRS — CHAMPLAIN CANAL.

Chapter 129, *Laws* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
Chapman L. Johnson	Division engineer	....	$2,400 00 per annum.	$200 01	$25 48	$225 49	
John F. Kelly	Division engineer	....	2,400 00 per anuum.	599 99	19 44	619 43	
John P. Kelly	Resident engineer	....	2,000 00 per annum.	146 61	7 26	153 87	
J. W Clark	Resident engineer	....	2,000 00 per annum.	163 38	11 75	175 13	
T. C. Leutze	Assistant engineer	25	5 00 per day	125 00	16 90	141 90	
James C. Dougrey	Rodman	26	3 50 per day	91 00	5 80	96 80	
William J. Smith	Rodman	55½	3 50 per day	194 25	....	194 25	
T. A. Paterson	Rodman	48	3 50 per day	168 00	40 87	208 87	
C. M. Pepson	Rodman	14	3 50 per day	49 00	....	49 00	
C. H. Barber	Rodman	26	3 50 per day	91 00	1 40	92 40	
John J. Allen	Chainman	159	4 00 per day	636 00	1 80	637 80	
B. Frederick	Chainman	106	2 50 per day	265 00	22 20	287 20	
William E. Leutjens	Chaiuman	14	2 50 per day	35 00	7 76	42 76	
							$2,924 90
Incidental expenses.							
Livery						$2 00	
Postage and telegraph						71 98	
Labor						51 38	
Stationery						71 15	
Miscellaneous						33 27	
							229 78
							$3,154 68

Extraordinary Repairs — Erie Canal.

Chapter 168, *Laws* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
James Ryan, Jr.	Rodman	37	$3 50 per day	$129 50	....	$129 50	
J. H. Jones	Rodman	43	3 50 per day	150 50	....	150 50	
C. M, Pepson	Rodman	130	3 50 per day	455 00	$14 96	469 96	
							$749 96
Incidental expenses.							
Livery						$5 00	
Stationery						34 86	
Fuel						4 95	
Office rent						116 69	
Miscellaneous						17 63	
							179 18
							$929 09

Extraordinary Repairs — Champlain Canal.

Chapter 168, *Laws* 1890.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
J. W. Clark	Resident engineer		$2,000 00 per annum	$10 86		$10 86	
E B Noyes	Assistant engineer in charge	122	6 00 per day	732 00	$80 80	812 80	
J. H. Jones	Rodman	12	3 50 per day	42 00	2 00	44 00	
A. Paterson	Rodman	131	3 50 per day	458 50	32 95	491 45	
J. C. Dougrey	Rodman	157	3 50 per day	549 50	20 75	570 25	
Wm. E. Lutjens	Chainman	5	2 50 per day	12 50	11 50	24 00	
							$1,953 36
Incidental expenses.							
Livery						$250 00	
Postage and telegraph						5 10	
Stationery						6 75	
Fuel and light						5 25	
Office rent						55 00	
Miscellaneous						7 40	
							329 50
							$2,282 86

Bottoming out Erie Canal.

Chapter 168, *Laws of* 1890.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
George I. Bailey	Assistant engineer in charge	23	$6 00 per day	$138 00	$51 51	$189 51	
B. Frederick	Chainman	11	2 50 per day	27 50	27 08	54 58	
							$244 09

Dredging Albany Basin.

Chapter 168, *Laws of* 1890.

Stationery	$13 00

Repairing Moyer Creek.

Chapter 113, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
John P. Kelly	Resident engineer		$2,000 00 per annum.	$21 72	$14 37	$36 09	
George I. Bailey	Assistant engineer in charge	66	6 00 per day	396 00	36 48	432 48	
Edwin Styring	Rodman	68	3 50 per dry	238 00	3 69	241 69	
C. H. Barber	Rodman	79	3 50 per day	276 50	1 22	277 72	
							$987 98
Incidental expenses.							
Postage and telegrams						$5 44	
Fuel and light						5 50	
Office rent						24 75	
Miscellaneous						17 29	
							52 98
							$1,040 96

LIFT-BRIDGE — NINETEENTH STREET, WEST TROY.

Chapter 239, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
John P. Kelly	Resident engineer	....	$2,000 00 per annum	$21 72	$1 30	$23 02	
T. C. Leutze	Assistant engineer in charge	53	6 00 per day	318 00	24 14	342 14	
J. Ryan, Jr.	Rodman	2	3 50 per day	7 00	1 48	8 48	
J. H. Jones	Rodman	2	3 50 per day	7 00	1 48	8 48	
William E. Lutjens	Chainman	6	2 50 per day	15 00	3 59	18 59	
							$400 71
Incidental expenses.							
Postage and telegrams						$0 30	
Miscellaneous						1 03	
							1 33
							$402 04

REPAIRING GLENS FALLS FEEDER.

Chapter 271, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
Jay W. Clark	Resident engineer	....	$2,000 00 per annum	$49 41	$27 86	$77 27	
Ellis B. Noyes	Assistant engineer in charge	10	6 00 per day	60 00	16 44	76 44	
J. H. Jones	Rodman	72	3 50 per day	252 00	4 74	256 74	
T. A. Paterson	Rodman	2	3 50 per day	7 00	8 41	15 41	
B. Frederick	Chainman	4	2 50 per day	10 00	16 89	26 89	
							$452 75
Incidental expenses.							
Postage and telegrams						$2 00	
Livery						28 00	
Miscellaneous						1 25	
							31 25
							$484 00

LITTLE FALLS DAM.

Chapter 480, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
J. W. Clark	Resident engineer	....	$2,000 00 per annum.	$147 29	$40 51	$187 80	
T. C. Leutze	Assistant engineer, in charge	7	6 00 per day	42 00	14 92	56 92	
H. Feldmeier	Assistant engineer, in charge	50	6 00 per day	300 00	6 49	306 49	
James Ryan Jr	Rodman	4	3 50 per day	14 00	11 21	25 21	
J. C. Dougrey	Rodman	5	3 50 per day	17 50	14 92	32 42	
C. M. Pepson	Rodman	6	3 50 per day	21 00	16 42	37 42	
Fred Lewis	Chainman	48	3 50 per day	168 00	....	168 00	
B. Frederick	Chainman	5	2 50 per day	12 50	14 42	26 92	
							$841 18
Incidental expenses.							
Postage and telegrams						$4 64	
Stationery						10 70	
Miscellaneous						2 10	
							17 44
							$858 62

SHINNECOCK AND PECONIC CANAL.

Chapter 436, *Laws of* 1890. *Chapter* 302, *Laws of* 1891. *Chapter* 356, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
J. W. Clark	Resident engineer	....	$2,000 00 per annum.	$16 29	$13 66	$29 95	
D. R. Lee	Assistant engineer	9	5 00 per day	45 00	17 00	62 00	
D. R. Lee	Leveler	222	4 50 per day	999 00	44 68	1,043 68	
Dorlon Clark	Leveler	21	4 50 per day	94 50	13 18	107 68	
J. H. White	Chainman	48	2 50 per day	120 00	10 00	130 00	
							$1,373 31
Incidental expenses.							
Postage and telegrams						$14 83	
Labor						130 00	
Stationery						4 00	
Fuel and light						2 80	
Office rent						70 00	
Miscellaneous						34 20	
							255 83
							$1,629 14

STATE BOARD OF CLAIMS.

Chapter 302, *Laws* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
T. C Leutze	Assistant engineer, in charge	63	$6 00 per day	$378 00	$99 14	$477 14	
George I. Bailey	Assistant engineer, in charge	3	6 00 per day	18 00	10 14	28 14	
James Ryan, Jr.	Rodman	34	3 50 per day	119 00	49 04	168 04	
John H. Jones	Rodman	34	3 50 per day	119 00	55 39	174 39	
William Miller	Chainman	46	2 50 per day	115 00	89 28	204 28	
William E. Lutjens	Chainman	38	2 50 per day	95 00	75 09	170 09	
							$1,222 08
Incidental expenses.							
Postage and telegrams						$2 30	
Livery						197 00	
Labor						1 50	
Miscellaneous						13 30	
							$214 10
							$1,436 18

STATE BOARD OF CLAIMS.

hapter 356, *Laws* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
T. C. Leutze	Assistant engineer, in charge	52	$6 00 per day	$312 00	$62 53	$374 53	
James Ryan, Jr.	Rodman	15	3 50 per day	52 50	29 28	81 78	
James C. Dougrey	Rodman	23	3 50 per day	80 50	41 42	121 92	
C. M. Pepson	Rodman	23	3 50 per day	80 50	33 11	113 61	
T. A. Paterson	Rodman	4	3 50 per day	14 00	17 57	31 57	
Wallace Greenalch	Chainman	33	2 50 per day	82 50	22 45	104 95	
							$828 36
Incidental expenses.							
Postage and telegrams						$1 90	
Livery						125 00	
Labor						8 00	
Miscellaneous						6 85	
							$141 75
							$970 11

MAKING SURVEYS AND MAPS REQUIRED BY STATE ENGINEER AND SURVEYOR.

Chapter 302, *Laws* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Total.	Amount.
T. C. Leutze	Assistant engineer, in charge	3	$6 00 per day	$18 00	....	$18 00	
James Ryan, Jr	Rodman	24	3 50 per day	84 00	....	84 00	
J. C. Dougrey	Rodman	23	3 50 per day	80 50	....	80 50	
C. M. Pepson	Rodman	20	3 50 per day	70 00	....	70 00	
Wm. J. Smith	Rodman	23	3 50 per day	80 50	....	80 50	
John J. Allen	Chainman	26	4 00 per day	104 00	....	104 00	
							$437 00

EXAMINATION TROY AND COHOES DAMS.

Chapter 155, *Laws* 1892.

NAME.	Rank.	Number of days	Rate of compensation.	Salary.	Travel.	Total.	Amount.
J. W. Clark	Resident engineer	....	$2,000 00 per annum.	$21 88	$3 05	$24 93	
T. C. Leutze	Assistant engineer, in charge	6	6 00 per day	36 00	3 43	39 43	
Charles G. Witbeck	Assistant engineer, in charge	5	6 00 per day	30 00	4 82	34 82	
Edwin Styring	Leveler	5	4 50 per day	22 50	4 41	26 91	
J. H. Jones	Rodman	2	3 50 per day	7 00	2 00	9 00	
J. C. Dougrey	Rodman	1	3 50 per day	3 50	1 00	4 50	
C. M. Pepson	Rodman	4	3 50 per day	14 00	4 23	18 23	
J. H. Higgins	Chainman	5	2 50 per day	12 50	4 59	17 09	
T. D. Lehaney	Chainman	2	2 50 per day	5 00	2 00	7 00	
							$181 91

The foregoing tables are summarized as follows:

ORDINARY REPAIRS.		
Erie canal, chapter 1[illegible]9, Laws 1891	$9,129 60	
Champlain canal, chapter 129, Laws 1891	3,154 68	
		$12,284 28
EXTRAORDINARY REPAIRS.		
Lengthening locks, Erie canal, chapter 168, Laws 1890	$929 09	
Improving Champlain canal, chapter 168, Laws 1890	2,282 86	
Bottoming out Erie canal, chapter 168, Laws 1890	244 09	
Bottoming out Albany basin, chapter 168, Laws 1890	13 00	
		3,469 04
Repairing Moyer creek, chapter 113, Laws 1891	$1,040 96	
Lift-bridge at Nineteenth street, West Troy, chapter 239, Laws 1891	402 04	
Repairing Glens Falls feeder, chapter 271, Laws 1891	484 00	
		1,927 00
Little Falls dam, chapter 480, Laws 1892	$858 62	
Shinnecock and Peconic canal, chapter 436, Laws 1890, chapter 302, Laws of 1891, chapter 395, Laws of 1892	1,629 14	
		2,487 76
SPECIAL SURVEYS.		
Making surveys and maps for use of the State Board of Claims, chapter 302, Laws 1891	$1,436 18	
Making surveys and maps for use of the State Board of Claims, chapter 356, Laws 1892	970 11	
Making surveys and maps required by State Engineer and Surveyor, chapter 302, Laws 1891	437 00	
Examination Troy and Cohoes dams, chapter 155, Laws 1892	181 91	
		3,025 20
Total		$23,198 28

TABLE OF CONTRACTS ON EASTERN DIVISION COMPLETED DURING THE YEAR ENDING SEPTEMBER 30, 1892.

ERIE CANAL.

NAME OF CONTRACTOR.	Date of contract.	Character of work.	LEGISLATIVE ACT.		Appropriation.	Engineer's estimate at contract price.	Final estimate.	Remarks.
			Chapter.	Year.				
John H. Nelson	July 29, 1891	Iron bridge superstructure over Moyer creek	113	1891	$20,000 00	$1,100 00	$1,187 68	
Brummelkamp & Conron	July 27, 1891	Protecting and restoring Moyer creek	113	1891		16,062 00	16,181 53	
Hilton Bridge Const'n Co.	Oct. 13, 1891	Superstructure of lift bridge at 19th street, West Troy	239	1891	14,000 00	8,695 00	8,954 72	
Patrick McKenna	Oct. 10, 1891	Substructure of lift-bridge at 19th street, West Troy	239	1891		2,764 00	2,964 64	
CHAMPLAIN CANAL								
Troy Pub. W'ks Co. (Ltd.)	Aug. 28, 1891	Improving 3,200 feet of Champlain canal, near Searles' waste-weir	168	1890	110,000 00	18,021 50	20,337 37	Made new banks heavier than originally intended.
Drake & Stratton Co. (Ltd.)	Oct. 31, 1891	Constructing wall of sluiceway around guard-lock at head of Glens Falls feeder	271	1891	6,000 00	2,944 75	3,385 07	Built more wall than was intended.
SHINNECOCK AND PECONIC CANAL.								
P. J. Brummelkamp	Aug. 7, 1890	For the extension of the jetties of the Shinnecock canal and the dredging of the canal	436 302 356	1890 1891 1892	45,130 15	16,157 00	30,254 58	Length of jetties and length of canal increased; storms also caused increased amount of dredging.

TABLE OF CONTRACTS PENDING ON THE EASTERN DIVISION ON THE 30TH DAY OF SEPTEMBER, 1892.

ERIE CANAL.

NAME OF CONTRACTOR.	Date of contract	Character of work.	Appropriation.	LEGISLATIVE ACT.		Engineers' preliminary estimate.	Engineers' estimate at contract prices.	Payments to date.
				Chap.	Year.			
Rapp & Co	July 23, 1892	Stone dam at Little Falls	$15,000 00	480	1892	$12,395 00	$9,964 00	$1,802 00
SHINNECOCK AND PECONIC CANAL.								
P. J. Brummelkamp	July 25, 1892	Substructure of swing bridge over Shinnecock canal	10,000 00	356	1892	4,250 00	4,584 00	2,142 00
Hilton Bridge Construction Co.	July 14, 1892	Superstructure of swing bridge over Shinnecock canal		356	1892	1,400 00	1,380 00	....

REPORT

OF THE

DIVISION ENGINEER

OF THE

MIDDLE DIVISION

FOR THE

YEAR ENDING SEPTEMBER 30, 1892.

APPENDIX B.

SYRACUSE, N. Y., *October* 1, 1892.

Hon. MARTIN SCHENCK, *State Engineer and Surveyor*:

I have the honor to submit the annual report of the middle division for the fiscal year ending September 30, 1892:

	Miles.	Totals.
This division comprises that portion of the Erie canal lying between the east lines of Oneida county and the south lines of Wayne county	97.02	
Also the following unabandoned lateral canals:		
Oswego canal from Syracuse to Oswego	37.78	
North and south side-cuts and slips at Salina	2.02	
Slips at Liverpool, Oswego canal	0.25	
Baldwinsville side-cut	0.59	
Cayuga and Seneca canal, Montezuma to Cayuga and Seneca lakes	22.99	
Black River canal, Rome to Lyons Falls	35.52	
Old Oneida Lake canal, Higginsville to first lock	1.05	
Chenango canal, from Erie canal to Fayette street	0.05	
Chemung canal, lake level	2.53	
		199.80
RIVER IMPROVEMENTS.		
Black river, Lyons Falls to Carthage	42.50	
Onondaga outlet, Onondaga lake to Seneca river	0.75	
Oneida river, three River Point to Brewertown and Oneida lake	20.00	
Seneca river towing-path, Mud lock to Baldwinsville	5.83	
Seneca river, Baldwinsville to Jack's Reefs (not used),	11.75	
Ithaca inlet, Cayuga lake to Ithaca	2.05	
Seneca lake outlet, from Cayuga and Seneca canal to Seneca lake	0.17	
		83.05
NAVIGABLE FEEDERS.		
Limestone creek feeder, Erie canal to Fayetteville	0.83	
Butternut creek feeder, Erie canal to feeder dam above Dunlap's mills	1.67	

	Miles.	Totals.
Camillus feeder, Erie canal to Camillus	1.04	
Delta feeder, foot of lock No. 9, Black river canal to Delta	1.40	
Black river feeder, Boonville to head of pond at Forestport	11.29	
		16.23
Total		299.08

ARTIFICIAL FEEDERS — NOT NAVIGABLE.

	Miles.
Chenango canal, summit level	5.31
Leland pond feeder	0.31
Madison brook feeder	2.99
West branch feeder	5.83
Bradley's brook feeder	0.67
Hatch's lake feeder	0.23
Kingsley's brook feeder	1.87
Oriskany creek feeder	0.53
Mohawk feeder at Rome	0.03
Oneida creek feeder	2.91
Cowassalon creek feeder	0.40
Chittenango creek feeder	0.28
Cazenovia lake outlet (improved)	0.51
Tioughnioga river feeder	1.00
De Ruyter reservoir outlet	0.12
Orville feeder (unnavigable portion)	0.55
Camillus feeder (unnavigable portion)	0.65
Carpenter brook feeder	0.18
Skaneateles creek feeder	0.09
Putman brook feeder	0.20
Centerport feeder	0.18
Owasco creek feeder (including 859 feet of iron pipe)	2.10
Lansing kill feeder	1.80
Sugar river feeder	0.14
New outlet of third Bisby lake	0.06
New outlet of Canachagala lake	0.16
Total	29.10

SOURCES OF WATER SUPPLY.

The canals upon this division are supplied with water from the following-named sources:

Erie Canal — Frankfort and Rome levels.

(Three and three hundred and fifty-six thousandths miles of Frankfort level on middle division. The Rome level, lock No. 46 to lock No. 47 = 55.957 miles.

	Cubic feet per minute.
Leland's pond, Madison brook reservoir, Eaton brook reservoir, Bradley brook reservoir, Hatch's lake, Kingsley brook reservoir and Oriskany creek, feed through the Chenango canal, Oriskany creek and Oriskany creek feeder into the Rome level, six miles west of lock No. 46	6,000
Mohawk river, Black river, Forestport pond, White lake reservoir, Chub lake, Sand lake, first, second and third Bisby lakes, Woodhull reservoir, Twin lakes, South branch reservoir, North branch reservoir, Canachagala lake, feed through the Rome feeder and Black river canal into the Rome level at Rome, fourteen miles west of lock No. 46	13,000
Oneida creek enters canal through feeder, thirty miles west of lock No. 46	1,000
Cowassalon creek enters canal through feeder thirty-one and a half miles west of lock No. 46	200
Cazenovia lake reservoir (for 100 days), Erieville reservoir (for 100 days), and Chittenango creek enter canal through Chittenango creek feeder, forty-one and a half miles west of lock No. 46	5,641
DeRuyter reservoir (for 100 days), enters canal through Limestone Creek (Fayetteville) feeder, fifty miles west of lock No. 46	3,891
Limestone creek (natural flow) enters canal through Limestone creek (Fayetteville) feeder, fifty miles west of lock No. 46	500
Jamesville reservoir (for sixty days) enters canal through Orville feeder, fifty-two miles west of lock No. 46	2,000
Butternut creek (natural flow) enters canal through Orville feeder, fifty-two miles west of lock No. 46	500
Total	32,732

Short level, from lock No. 47 to No. 48 = .188 of a mile; fed from Rome level.

Mile level, from lock No. 48 to 49 = .714 of a mile; fed from Rome level through short level.

	Cubic feet per minute.
Syracuse level, from lock No. 49 to 50 = 5.014 miles fed from Rome and Jordan levels.	
Jordan level, from lock No. 50 to 51 = 14.903 miles.	
Otisco lake reservoir feeds through Camillas feeder into the canal four miles west of lock No. 50	5,146
Nine-mile creek (natural flow), fed through Camillus feeder into canal, four miles west of lock No. 50	800
Carpenter brook enters canal through feeder, ten miles west of lock No. 50	200
Skaneateles lake reservoir feeds into canal at Jordan, thirteen miles west of lock No. 50	8,766
Total	14,912

Port Byron level, from lock No. 51 to 52 = 7.793 miles; from Jordan level, through lock No. 51.	
Putnam brook feeder, at Weedsport	200
Owasco lake reservoir, through feeder at Port Byron	4,033
Total	4,233

Montezuma level, from lock No. 52 to Wayne county = 9.098 miles; from Port Byron level, through lock No. 52 and from Lake Erie	4,000

Oswego Canal.

Erie canal at Syracuse	10,000
Seneca river	54,000
Oneida river	20,000
Total	84,000

Cayuga and Seneca Canal.

Seneca lake	18,000
Erie canal at Montezuma	4,000
Total	22,000

SUMMARY OF WATER SUPPLY MEASURED.

Erie Canal.

	Cubic feet per minute.	
	Amounts.	Totals.
Frankfort and Rome levels	32,732	
Jordan level	14,912	
Port Byron level	4,233	
		51,877

Oswego Canal.

	Cubic feet per minute. Amounts.	Cubic feet per minute. Totals.
From Seneca river	54,000	
From Oneida river	20,000	
		74,000

Cayuga and Seneca Canal.

	Amounts.	Totals.
From Seneca lake	18,000	
		18,000
		143,877

BLACK RIVER CANAL AND RIVER IMPROVEMENT.

CANALS.	Elevation in feet above tide water.	Surface area in acres	Average area in acres.	Average Depth in feet.	Capacity in cubic feet.
White Lake reservoir (not used)	....	....	296	5	64,468,800
Chub Lake reservoir (approximate)	1,599	....	200	4	34,848,000
Sand Lake reservoir	....	....	306	15	199,940,400
Woodhull reservoir (two years in filling),	1,854	1,236	1,118	18	876,601,440
First, Second and Third Bisby lakes (approximate)	....	....	....	3½	40,000,000
Canachagala lake (approximate)	....	....	320	4	55,756,800
North Lake reservoir (can fill twice yearly)	1,821	423	277	28	337,851,360
South Lake reservoir	2,019	518	372	26	421,312,820
Twin Lake reservoir (approximate)	....	....	175	8	60,984,000
Forestport pond	....	....	....	....	....
Mohawk river, through Delta feeder	....	....	....	....	....
Pond above Lyon's Fall dam	....	....	....	....	....
River Improvements.					
Forge pond	....	....	....	....	....
First lake of the Fulton chain	1,691	....	....	....	....
Second lake of the Fulton chain	1,691	....	....	....	....
Third lake of the Fulton chain	1,691	....	....	....	....
Fourth lake of the Fulton chain	1,691	....	....	....	....
Fifth lake of the Fulton chain	1,691	9	....	....	....
Sixth lake of the Fulton chain	1,772	109	....	....	....
Seventh lake of the Fulton chain	1,772	867	....	....	....
Eighth lake of the Fulton chain	1,776	309	....	....	....
Black river	....	....	....	....	....
Moose river	....	....	....	....	....
Beaver River reservoir	....	....	....	....	....

There has been no change in the water supply during the fiscal year.

NAVIGATION.

All the canals on this division were closed November 30, 1891, and opened May 1, 1892. The following disasters occurred during the year:

On October 25, 1891, a Rome, Watertown and Ogdensburg Railroad locomotive plunged into the Erie canal at Franklin street, Syracuse, delaying navigation six hours.

On October 30, 1891, a canal boat collided with the east pier of the weigh-lock, Syracuse, and sank diagonally across the canal, delaying navigation fifteen hours.

On November 27, 1891, a break occurred in the towpath bank of the Baldwinsville side-cut, at Baldwinsville. It was repaired without serious delay to navigation.

On May 4, 1892, a bad leak was discovered on the Erie canal above Lock No. 47, and just east of the New York Central and Hudson River Railroad tunnel. This was an old leak which had been neglected. The stop gate at East Syracuse was raised, and the west end of the Rome level partially drawn off. The break was repaired during the night with but slight delay to navigation.

On June 23, 1892, a break occurred at a culvert on the towpath side of the Erie canal at Weedsport. Navigation was delayed forty-eight hours.

On July 13, 1892, a break occurred about five miles north of Rome, on the Black River canal, at Hicks' mills. About fifty feet of the towpath was washed out from six to ten feet below canal bottom. This break was caused by the failure of an old raceway under the canal, used to conduct the waste water from the mill. Navigation was delayed four days.

No other disasters of note have occurred, or any detention to navigation than as above stated.

WATER SUPPLY.

No difficulty has been experienced during the past season, in regard to water. The new Forrestport reservoir, now under construction, will ensure sufficient water supply to maintain the Rome level at its standard height.

IMPROVEMENT OF CHANNEL.

Much has been done to restore the prism of the canal to its original depth, with very beneficial results. Prior to the opening of navigation the towpath side of the prism of the Erie canal was bottomed out at the worst places all along this division. Since the opening of navigation the State dredge has been employed continuously on section No. 5, removing the deposit on the berme side of the prism. Many low places in the banks have been raised, so that the full amount of water can be carried with safety.

On the lateral canals but little cleaning out has been done, and the condition of the channels grows yearly worse. On the Black River canal receivers should be built in the various streams which empty into the canal, to receive the extensive deposits of shale which accompany every heavy rain. A liberal appropriation should be made for restoring the prism of the Oswego canal to its original condition.

STRUCTURES.

On the Erie canal and its feeders the structures are generally in good condition. The present wooden bridges should be replaced with iron ones as fast as worn out.

On the Oswego canal and its side cuts, the structures are in fair condition, with the exception of the Baldwinsville dam. This is in a very dangerous condition, menacing the life and property of hundreds, and should be entirely rebuilt at once. In case of the failure of this dam, the State would be liable for damages far exceeding the amount required for its reconstruction.

The Cayuga and Seneca canal extends from the Erie canal at Montezuma to Geneva, at the foot of Seneca lake, with a branch from Mud lock to Cayuga, at the foot of Cayuga lake, thus giving the people of Watkins, at the head of Seneca lake, and of Ithaca, at the head of Cayuga lake, a waterway by the Cayuga and Seneca and Erie canals, to Albany and New York. The structures are in fair condition.

The Black River canal needs immediate attention on the part of the State to save it from general decay. The failure of the Legislature last winter to appropriate money to improve the canal has been sorely felt by all the boatman along its line. The life of the Erie canal depends on this lateral feeder. The Black River canal is the only means of conducting the waters of the North Woods reservoirs to the Erie canal.

DITCHING AND DRAINING.

Appropriations should be made for constructing or reopening drainage ditches to carry off the leakage from the canals. The failure to provide for this leakage has involved the State in continual litigation, with the result that the amount annually expended by the State in payment of damages from this cause largely exceeds what it would cost to construct and maintain suitable ditches. An annual appropriation should be made for this work.

SPECIAL SURVEYS.

An appropriation should be made to complete the survey and maps of the flow-line of the new Black River reservoir above Forestport dam.

A special appropriation should be made for a re-survey of the bridges on this division. The record of bridges made in 1876 has outgrown its usefulness, owing to the many new structures which have been erected since that date.

APPROPRIATIONS OF 1890.

Chapter 295.

Board of Claims surveys. $62.92 were spent on surveys on Erie canal.

Chapter 385.

Improving sanitary condition of the old abandoned Erie canal in the city of Rome. The improvement of Wood creek, as the preliminary to the improvement of the old canal, has been made by the superintendent, under the advice of the engineer department.

APPROPRIATION OF 1891 — ERIE CANAL.

Chapter 69.

Providing for the erection of a swing bridge over the Erie canal at Schuyler street, Utica. The work was let August 19, 1891.

A double end swing bridge, with roadway only, was placed at the head of lock No. 46. The work was completed May 1, 1892.

Chapter 241.

Constructing sidewalks to be attached to a bridge over the Erie canal at DePuyster street, Rome. This work was let July 27, 1891, and completed in accordance with the law.

Chapter 341.

Removal of Genesee street bridge over the Erie canal in the city of Utica and the erection of an iron bridge and hoist or lift bridges. Plans were made, but the contract was not let, owing to the refusal of the city authorities of Utica to assume liability for all damages arising from change of grades.

BLACK RIVER CANAL.

Chapter 342.

Clearing the flow ground of the new Black river reservoir at the head of Forestport pond. The work was advertised June 30, 1891, but not let, as the bids were above the available appropriation. This letting provided for the ground to be cleared to a height of 5.4 feet above the crest of the new dam. The acreage has since been reduced by lowering the flow line to one foot above the crest of the new dam. The work was then let July 20, 1892, and is now in progress.

OSWEGO CANAL.

Chapter 226.

Completion of the canal wall between the Oswego canal and the Oswego river, in the city of Oswego. This work was done by day labor under the direct charge of the Superintendent of Public Works.

APPROPRIATIONS OF 1892 — ERIE CANAL.

Chapter 199.

Culvert under the Erie canal at West Utica. This work was let April 11, 1892. A four-foot cast iron pipe culvert was constructed with masonry cut-off walls in the berme and towpath banks. The work was completed May 3, 1892.

Chapter 601.

Wrought iron bridge over the Erie canal at Madison street, Rome. This work was let July 20, 1892. Nothing has yet been done.

BLACK RIVER CANAL.

Chapter 494.

Completing the reservoir on the Black river above Forestport pond. The masonry for the bulkhead and abutment, with the embankments connecting them with natural ground, were completed under chapter 274, Laws of 1889. Contracts calling for the completion of the dam, and for raising roads and bridges within flow line, were let July 20, 1892, and the work is well under way. One section of the spillway of the dam will be finished this fall and the work of raising the roads and bridges will also be completed.

Chapter 469

Raising dam at Beaver river, Stillwater. Beaver River dam was built in 1886. The present law calls for raising this dam five feet. The contract was let August 30, 1892, and the work is now in progress.

Chapter 271.

Constructing a retaining wall along the Black River canal at Rome. Plans are made, but contract has not yet been let.

OSWEGO CANAL.

Chapter 229.

Hoist bridge at North Carolina street, Syracuse. Plans for this work have been submitted, but the contract has not yet been let.

MISCELLANEOUS.

Chapter 234.

Dredging Cayuga Inlet. Plans submitted, but contract not yet let.

Chapter 249.

Improving Mad Brook at Sherburne. The contract for this work was let August 30, 1892, and the work is now in progress.

Chapter 471.

Repairing Eaton, Bradley and Kingsley Brook reservoirs. Plans have been submitted, but the work has not been let.

Chapter 356.

Board of Claims surveys. Under this act $264.99 has been expended on the Erie canal, $2,281.29 on the Oswego canal and $12.46 on the Black River canal, making a total of $2,558.74.

ORDINARY REPAIRS MADE DURING THE PRESENT FISCAL YEAR — ERIE CANAL.

Aqueducts.

No. 2. Oriskany. Trunk was strengthened by inserting a few posts and floor timbers.

No. 4. Chittenango. Trunk partially rebuilt.

No. 10. Port Byron. Tow-path bridge over aqueduct rebuilt.

No. 11. Crane Brook. Mortared joints of one wing in rear.

Bridges.

Nos. 11, 14, 26, 29, 34, 39, 45, 51, 59, 86, 87, 95, 116, 121, 122, 126, 127, 134, 136, 137, 145 were replanked.

Nos. 32, 34½, 37, 52, 55, 115, 141. Replanked and new joists.

No. 15. Rebuilt of iron by city of Utica.

Nos. 80, 143. Replanked and new needle-beams.

No. 144. Rebuilt.

No. 85. Taken down.

No. 100. New wheels; had general repairs.

Nos. 130, 135. Sidewalks rewooded.

Bulkheads and waste-weirs.

No. 1. Ballou Creek. Bulkhead rebuilt and masonry repaired.

No. 2. Bulkhead rebuilt and masonry repointed.

No. 6. Bulkhead rebuilt; masonry taken down and relaid.

Culverts.

Nos. 2, 3, 4, 5. Cleaned out and repaired.

Locks.

No. 46. Had two new gates and one new miter-sill; masonry pointed.
No. 47. One new tumble-gate and two new balance-beams.
No. 48. One new tumble-gate; two new gates.
No. 49. Two new balance-beams; four new gates provided for.
No. 51. Three new balance-beams.

Docking.

About 8,000 lineal feet of docking timber was renewed.

Camillus Feeder.

Bridge at Camillus rebuilt.

OSWEGO CANAL.

Bulkheads.

Fulton Dam. Two sections of each bulkhead rebuilt.
High Dam. Three sections of bulkhead rebuilt.

Bridges.

Nos. 2, 9, 12 and 17 were repaired.
Nos. 14, 22, 16 and 29 were replanked.
Nos. 16 and 29 had new joists.
No. 19 had new needle-beams, joists and planks.
No. 15 had new saddles.
Nos. 15 and 20 had new sidewalks.
Baldwinsville canal bridge repaired.

Locks.

Nos. 1, 2, 14 and 16 had one new gate each.
No. 8 had one new foot-bridge.
Nos. 1, 3, 4, 5 and 23 were repaired.
Nos. 6 and 11 had new balance-beams.
No. 5 and guard-locks Nos. 4, 7 and 17 had two new gates.
No. 14 had new lock-house.
Baldwinsville guard-lock, repaired and two new guard-gates put in.

Docking.

Five thousand four hundred lineal feet of docking timber was renewed.

Spillways.

Spillway at head of Lock No. 10 was rebuilt.

Walls.

About 350 lineal feet of vertical wall rebuilt.

CAYUGA AND SENECA CANAL.

Bridges.

Towpath bridges Nos. 6, 10 and 14 were repaired.
No. 11. Sidewalks repaired.
Nos. 13, 17 and 18. Replanked.

Locks.

Nos. 3 and 10 had two new gates each.
No. 6 had two new balance-beams.

Dams.

Demout's and Burns' dams were repaired with loose stone filling.

BLACK RIVER CANAL.

Aqueducts.

No. 1, Mohawk. Trunk was entirely rebuilt.
No. 5, Lansingkill. Repaired with new timber and plank.

Bridges.

Nos. 1, 3 18 and 22 were replanked.
No. 2. Repaired with new sidewalks.
Nos. 4, 5, 6, 7, 15, 17, 19, 21, 27, 28, 29, 30 and 31 were repaired.
No. 38. South abutment was rebuilt.
Bridge over guard-lock at Forestport was rebuilt.
Bridges Nos. 1, 2 and 5 on Forestport feeder had each one new bent.

Locks.

Nos. 2, 17, 25, 26, 35, 36, 39, 40, 41, 42, 43, 44, 45, 46, 47. Foundation was replanked.

Nos. 10, 15, 22, 5, 38, 87. Each had two new gates.

Nos. 9, 11, 16, 23, 28, 30, 32, 55, 67, 70, 61, 2, 4, 72, 85, 88, 95, 96, 97. One new gate each.

Nos. 6, 63. Apron repaired.

Nos. 14, 15, 20. Bottom repaired.

Nos. 24, 39, 40, 41, 42, 43. Repaired.

Nos. 28, 40, 43, 49, 18, 39. Walls dressed off to allow boats to enter.

Nos. 63, 67, 69. One miter-sill put in.

Nos. 12, 35, 70 and 71, were pointed.

Culverts.

Nos. 2 and 3 were cleaned out.

Lock-houses.

All were repaired and a new one built at lock No. 14.

REPAIRS NEEDED — ERIE CANAL.

Aqueducts.

All need pointing.

No. 1, Sauquoit. Protect berme bank with brush and stone.

No. 2, Oriskany. New trunk.

No. 5, Limestone. West abutment needs pointing and puddling in rear.

No. 9, Centerport. Leak through east abutment, towpath side. Should be excavated, refilled and puddled.

No. 11, Crane Brook. Relay west abutment.

No. 12, Seneca river. Three spans of trunk need rebuilding.

Bridges.

No. 2. Needs rebuilding.

Nos. 3, 73, 74, 75, 79, 92, 96, 97, 142. Need new joists and planks.

Nos. 4, 34½, 37, 69, 70, 71, 93, 98, 103, 139. Need replanking.

Nos. 16, 21, 22, 28, 94, 100, 101. Need new sidewalks.

Nos. 25, 110, 111, 112, 138. Rods need tightening.

Nos. 26, 57, 65½, 66, 80, 82, 83, 89, 113, 114, 117, 119, 123, 124. Rebuilt.

Abutments of road bridge over Oriskany feeder should be rebuilt.

Nos. 39, 75, 104, 106, 111, 134, 136, 137. Need new coping plank.

Nos. 77, 88. Need replanking, new coping and guard-rail on approaches.

No. 103. Machinery overhauled and present wheels replaced by adjustable couplings.

No. 109. Needs general repairs.

No. 140. Needs new leveling timbers.

Bulkheads and Waste-weirs.

No. 7. Bad leaks through masonry. Should be rebuilt.

No. 8. Bad leaks through masonry. Should be repointed and embankment puddled at ends.

No. 4. Masonry should be rebuilt and placed on towpath side to relieve culvert under canal.

Culverts.

Nos. 6, 8, 27, 43 and 74. Rebuild towpath end (masonry) and point berme end.

Nos. 28, 29, 32, 40. Rebuild both ends.

Nos. 13 and 36. Rebuild and enlarge (present culverts are too small to carry the streams in large freshets).

Nos. 20, 21, 33, 39, 45, 48, 49, 57, 58, 61, 62 and 73. Point masonry and general repairs.

Nos. 11, 12, 22, 34, 35, 36, 50 and 64. Point masonry.

Nos. 38, 53. Protect apron and point masonry.

No. 42. Rebuild berme end.

Docking.

Rebuild 100 lineal feet at each end of Camillus aqueduct.

Feeders and Dams.

Rome. Should have new bulkhead and masonry repaired. A retaining wall is needed on the river bank above the Mohawk dam at Rome.

Oneida feeder. Should be cleaned out and banks raised.

Bradley brook feeder. Clean out and raise banks and raise dams in Bradley brook.

At junction of Bradley brook feeder with Chenango river, new bulkheads.

The dams on Oriskany and Cowassalon creeks need general repairs.

Bulkhead and masonry at head of Camillus feeder should be rebuilt at once.

Camillus feeder dam. Apron needs replanking.

Locks.

No. 47. Needs two new lower gates on towpath side.

No. 48. Needs new miter-sill on towpath side.

No. 49. Needs four new lower gates (provided for).

No. 51. Needs two new upper gates, one new miter-sill and two new balance-beams.

No. 52. Needs two new balance-beams. There is a bad leak around the towpath lock which needs repairing.

Receivers.

No. 1. On berme west of Centerport. Rebuilt.

Reservoirs.

Madison brook. New bulkheads in feeder.

The repairs recommended in last annual report for Eaton, Bradley brook and Kingsley brook are provided for by chapter 471, Laws of 1892.

Hatche's lake. New bulkhead. Stone abutment.

Jamesville. Strengthen and protect foot of dam and make a new channel for waste water, parallel with dam from spillway to natural channel of the creek, as recommended in 1888.

Spillways.

At Amos mill, Syracuse, raise to standard height (seven feet above canal bottom).

Towpath.

Should be raised to standard height in low places along the canal.

Slope Walls.

The top, for about four feet, needs relaying in many places, especially through the city of Utica. The bench walls on Jordan level should be replaced with full height slope walls.

Vertical Wall.

General repairs are needed at many places. Provision should be made for about two miles of vertical wall on this division.

Miscellaneous.

The gates should be taken out of old dry-dock at Grove Springs and the berme bank built across the opening.

The tumble-gate at entrance of new Oneida Lake canal should be taken out and towpath bank built across the opening.

The bank (towpath) east of Salt street bridge, Montezuma, should be loaded with brush and stone to prevent sliding.

OSWEGO CANAL.

Bridges.

Mud lock bridge and Park street bridge should be rewooded.

Bridge over south side cut, and Third North street bridge over north side cut should be rebuilt.

Nos. 15, 21, 22 need new sidewalks.

Nos. 14, 20, 28 need rebuilding.

Dams.

Oswego dam. Build new sloping apron. This work should be done by Superintendent of Public Works, not by contract.

Battle Island dam. Two hundred and fifty lineal feet of apron was washed out last winter and should be rebuilt at once. A special appropriation should be obtained for this work.

Baldwinsville dam. Should be rebuilt of stone.

Docking.

Five thousand lineal feet of docking timber is needed on this canal at various points.

Locks.

No. 2. One gate.

No. 3. One gate.

Guard-lock No. 5. Needs one upper towpath gate

No. 11. Remove lock machinery from this lock and place it in No. 8.

No. 13. Build retaining wall to prevent material washed from hillside filling the lock.

No. 16. Needs two new lower gates.

Vertical wall.

Five hundred lineal feet of vertical wall should be built through village of Fulton to protect towpath, which is now in a very dangerous condition.

Miscellaneous.

Piers at outlet of Onondaga lake should be rebuilt.

Spillway at Haskins' Mills, Syracuse level, should be raised to standard height.

CAYUGA AND SENECA CANAL.

Bridges.

No. 12. Two roadways need replanking.

T. P. Bridges No. 12 and No. 16. Need new planking.

T. P. Bridge No. 13. Three spans need replanking.

No. 19. Needs two new wheels.

Locks.

Mud Lock. Needs two new gates (provided for).

Montezuma. Needs two new lower gates.

Docks.

Two thousand lineal feet at Geneva needs renewing.

Retaining walls.

The retaining wall on the second level of this canal is in very poor condition. A special appropriation should be obtained to put this in good repair.

BLACK RIVER CANAL.

Aqueducts.

No. 2, above lock No. 13. Rebuild trunk and repair masonry.

No. 3, Willis creek. Rebuild pier and point masonry.

No. 4, Stringer creek. Repair and point masonry, (stone are very poor,

No. 5, Lansingkill. Repair and point masonry and clear channel.

No. 6, Sugar River. Point masonry.

Bridges.

The bridges on this canal are not in good repair.

Five farm bridges need rebuilding, and many need replanking.

Bridge over spillway at North Lake needs rebuilding.

BLACK RIVER IMPROVEMENT.

Bridges.

Whittlesey's. Replace swing with iron. The present structure has been condemned by the town commissioners as unsafe.

Illingsworth's. Replace swing with iron, new end; brace north truss of west fixed span.

Castorland. Two spans burned last spring, and replaced by temporary structures, which will be carried away by spring freshets or ice, should be replaced by permanent iron structures.

Replank swing.

Carthage. Should be rebuilt.

All bridges need painting. River bridges at Lyons' Falls and Carthage should be replanked.

FORESTPORT FEEDER.

Bridges.

Nos. 3, 7 and 11. New bents (towpath and berme).

Nos. 4 and 9. New berme bents.

No. 10. New chord, west truss.

All need painting.

Nos. 3, 7, 8 and 9 need replanking.

Culverts (main line).

No. 3. A receiver dam should be built in the creek above the culvert to collect the shale which now fills the culvert and channel below in every freshet.

No. 4. Relay coping.

No. 7. Repair foundation and relay masonry, towpath end, point masonry on berme.

All need repointing.

Dams and bulkheads.

Lansingkill. Rebuild bulkhead, repair apron, build wing-dam of cribs on east side, to throw current toward feeder, and point masonry.

Otter Creek (river improvement). Relay vertical wall at west end, below dam, and point masonry.

Bush's. Point masonry and fill hole in embankment at west end.

(Forestport Feeder.) Rebuild bulkhead No. 3.

Locks.

Nos. 3, 18, 33, 35, 37, 39, 40, 55, 71 and 76 should be rebuilt.

Otter creek lock (river improvement). Should be rebuilt at once from low-water line (including docking at head), and new gates, and new quoins put in.

No. 4. Foundation needs extensive repairs.

No. 9. Needs new hollow quoin coping.

Nos. 9, 11, 13, 21, 27, 34 and 75. Bottoms need replanking.

No. 12. Needs pointing.

(Forestport Feeder) Guard-lock, needs two new upper gates and one new miter-sill.

Delta guard-lock needs two new upper gates.

Combined locks Nos. 87, 88, 89 and 90 need new sluice.

Two new lock-houses (needed) on section No. 1.

Prism.

Nearly the whole canal needs bottoming out and receiver dams built above the canal in all streams which bring down debris.

A special appropriation should be obtained for bottoming out Forestport feeder to its original depth. This is the principal feeder of the Erie canal and it is very necessary to have the channel cleaned out in order to have sufficient flow of water to feed the canal.

Reservoirs.

A new house is needed at Woodhull.

North Lake dam should be raised two feet and a larger relief way provided. Old State road from North Lake to Woodhull reservoir should be rebuilt.

Beaver river dam. The new Adirondack & St. Lawrence R. R., runs within seven miles of this dam. Hitherto, the nearest entrance to this dam was by way of Lowville, making a thirty mile drive over a very rough road. I recommend that a special appropriation be obtained to construct a new road from Stillwater to South Branch, a distance of seven miles, thus giving ready access to this reservoir.

Spillways.

Nos. 1, 3. Forestport feeder. Rebuilt entire.

Nos. 2, 4, 8. Point masonry.

RECOMMENDATIONS REQUIRING SPECIAL APPROPRIATIONS OR USE OF GENERAL IMPROVEMENTS APPROPRIATIONS ALREADY MADE.

ERIE CANAL

Vertical Wall.

An appropriation sufficient to rebuild two miles of vertical wall on this division should be made.

Culvert No. 13. (Whitehall's). Rebuild and enlarge (see "Repairs Needed, Erie Canal Culverts.")

Waste weir No. 4, and culvert No. 26 (near Higginsville). Rebuild on change of plan.

Replacing old bench walls with full height slope walls.

Enlargement of Port Byron feeder. For this I quote the reasons given in the last annual report:

"A considerable quantity of water is fed through lock No. 51 to supply the deficiency on the Port Byron level, caused by the inadequacy of the Owasco feeder. The latter consists of an iron pipe at the canal end, having a capacity of 6,000 cubic feet per minute, and an open channel supplying the pipe, which has a capacity of only 4,000 cubic feet per minute and frequently, owing to obstructions from eelgrass, etc., only actually delivers about 2,000 cubic feet per minute. If this channel were enlarged to the full capacity of the pipe it would with the lockage and leakage from lock No. 51, fully supply the present needs of the Port Byron level, thus reducing the demand upon the Jordan level.

"A better plan, however, in my opinion, is to make a new open feeder to the canal from the first dam south of the same.

"It would be less expensive; would lie at the level of canal instead of fifteen feet above it; would avoid the high, dangerous banks of the present feeder; would be only about one-fifth as long, would give a storage pond of about thirty acres, about three-eighths of a mile from the canal; be more accessible and more permanent, requiring less care and less expense for repairs.

"I would recommend the construction of this open feeder at an early day with a head-gate capacity of 8,000 cubic feet per minute— the total flow of the stream in dry season — to provide for future emergencies. The additional cost of the increase of capacity would be a mere trifle."

OSWEGO CANAL.

Retaining wall at lock No. 13.

Sloping apron, Oswego dam. (See "Repairs Needed," Oswego Canal.)

Rebuilding apron, Battle Island dam. (See "Repairs Needed," Oswego Canal.)

Dam at Baldwinsville. (See "Repairs Needed," Oswego Canal.)

Placing lock machinery in lock No. 8.

BLACK RIVER CANAL.

Rebuilding locks (See "Repairs Needed," Black River Canal.)

Iron swing bridges on Black River, at Whittlesey's and Illingsworth's. (See "Repairs Needed, Black River Improvement.")

New iron bridge (two spans) at Castorland on the Black River. (See "Repairs Needed, Black River Improvement.")

Clearing the reservoir on Beaver River at Stillwater. Estimated cost $80,000.00.

Reservoirs.

Completing flow line survey of new Black River reservoir. (See "Surveys of Reservoirs.")

Constructing road from Stillwater to South Branch. (See "Repairs Needed, Reservoirs.")

GENERAL.

Bottoming out and raising banks.

Resurvey of bridges, (see "Special Surveys.")

Cleaning ditches.

Engineering.

This division has been under the charge of Henry T. Beach, as division engineer and David E. Whitford, as resident engineer from October 1, 1891 until May 15, 1892, and Russell R. Stuart as division engineer, and David E. Whitford as resident engineer from May 15, 1892 to September 30, 1892.

The extraordinary work has been so scattered as to require a seemingly large force of assistants, and has caused a large expense for travel, which, however, has been kept as low as was consistent with the proper performance of the work.

Considerable time has been spent in making surveys and maps, and collecting data for the Board of Claims, which has been done under the special appropriation for that purpose. A further appropriation should be made for this class of work for the coming year.

Maps, plans and specifications have been made for most of the new work, and others are in course of preparation. Work done under ordinary repairs has been promptly attended to.

I attach table No. 1 showing distribution of engineering expenses, No. 2 showing status of construction work under special appropriations, and No. 3 giving the water record of Cayuga and Cross lakes and Seneca river, as per concurrent resolutions of 1884.

This record does not accomplish the desired object, if I understand it correctly. The dates of measurements are fixed by the resolution, and do not show either highest or lowest water, nor do the results afford any comparison between the original and present condition of the lakes and river. If it is desirable to continue these measurements, self-registering gauges should be set at the specified points, which would give a complete record of the fluctuations of the water.

The comparative condition can not be obtained, as no records exist of the state of lakes and river channel before the attempted improvement of the river channel. I doubt if any good result will follow the continuance of these measurements.

I also attach table No. 4, giving corrected record of structures, and table No. 5 giving corrected description and elevation of bench marks on the Erie canal..

All of which is respectfully submitted.

R. R. STUART,
Division Engineer.

TABLE No. 1.

Statement showing the names, rank and compensation of engineers employed on the Middle Division of the New York State Canals, together with the incidental expenses for the fiscal year ending September 30, 1892.

ORDINARY REPAIRS — ERIE CANAL.

Chapter 129, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
H. T Beach	Division engineer	....	$2,400 00 per annum	$733 70	$54 86	$788 56
R. R. Stuart	Division engineer	....	2,400 00 per annum	294 31	96 00	390 31
D. E. Whitford	Resident engineer	....	2,000 00 per annum	558 37	78 22	636 59
Charles G. Witbeck	Assistant engineer in charge	38	6 00 per day	228 00	11 54	239 54
R. R. Stuart	Assistant engineer in charge	62	6 00 per day	372 00	33 41	405 41
R. R. Stuart	Assistant engineer	39	5 00 per day	195 00	22 86	217 86
J. M. Farley	Assistant engineer	10	5 00 per day	50 00	5 25	55 25
A. C. Driscoll	Assistant engineer	4	5 00 per day	20 00	4 38	24 38
A. C. Driscoll	Leveler	91	4 50 per day	409 50	62 01	471 51
Charles A. Cockroft	Leveler	19	4 50 per day	85 50	10 41	95 91
Theodore A Hendrickson	Leveler	31	4 50 per day	139 50	8 76	148 26
Paul L. Schultze	Leveler	9	4 50 per day	40 50	7 36	47 86
Theodore A. Hendrickson	Rodman	172	3 50 per day	497 00	54 88	551 88
N. E. Whitford	Rodman	9	3 50 per day	31 50	....	31 50
Henry Blum	Chainman	301	4 00 per day	1,204 00	54 15	1,258 15
T. V. Owens	Chainman	179	2 50 per day	447 50	90 76	538 26
M. J. Rosa	Chainman	7	2 50 per day	17 50	5 12	22 62
Thomas J. Welch	Chainman	58	2 50 per day	145 00	7 66	152 66
Edward J. Berry	Chainman	5	2 50 per day	12 50	2 84	15 24
						$6,091 85
	Incidental expenses.					
Labor					$1 50	
Stationery					351 98	
Fuel and light					71 08	
Postage and telegraph					122 02	
Miscellaneous					744 92	
						1,291 50
Total expenses, etc., Erie canal						$7,383 50

ORDINARY REPAIRS — OSWEGO CANAL.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
H. T. Beach	Division engineer	....	$2,400 00 per annum	$360 00	$1 50	$361 50
R. R. Stuart	Division engineer	....	2,400 00 per annum	180 00	21 60	201 60
D. E. Whitford	Resident engineer	....	2,000 00 per annum	272 96	7 70	280 66
R. R. Stuart	Assistant engineer in charge	10	6 00 per day	60 00	18 20	78 20
R. R. Stuart	Assistant engineer	22	5 00 per day	110 00	17 40	127 40
J. M. Farley	Assistant engineer	18	5 00 per day	90 00	42 80	132 80
A. C. Driscoll	Leveler	1	4 50 per day	4 50	90	5 40
Charles A Cockroft	Leveler	13	4 50 per day	58 50	22 80	81 30
Theodore A. Hendrickson	Rodman	31	3 50 per day	108 50	20 70	129 20
T. V. Owens	Chainman	11	2 50 per day	27 50	9 95	37 45
						$1,435 51
Incidental expenses.						
Labor					$7 00	
Postage and telegraph					1 75	
Miscellaneous					75	
						9 50
Total expenses of Oswego canal						$1,445 01

ORDINARY REPAIRS — BLACK RIVER CANAL.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
H. T. Beach	Division engineer	....	$2,400 00 per annum	$245 00	....	$245 00
R. R. Stuart	Division engineer	....	2,400 00 per annum	190 00	$66 51	256 51
D. E. Whitford	Resident engineer	....	2,000 00 per annum	315 36	46 62	361 98
R. R. Stuart	Assistant engineer, in charge	10	6 00 per day	60 00	30 59	90 59
R. R. Stuart	Assistant engineer	16	5 00 per day	80 00	....	80 00
J. M. Farley	Assistant engineer	7	5 00 per day	35 00	2 96	37 96
A. C. Driscoll	Assistant engineer	1	5 00 per day	5 00	5 56	10 56
A. C Driscoll	Leveler	11	4 50 per day	49 50	9 73	59 23
Charles A. Cockroft	Leveler	7	4 50 per day	31 50	....	31 50
Theodore A. Hendrickson	Rodman	15	3 50 per day	52 50	18 54	71 04
Henry Blum	Chainman	11	4 00 per day	44 00	31 63	75 63
T. V. Owens	Chainman	7	2 50 per day	17 50	14 29	31 79
						$1,351 79
	Incidental expenses.					
Labor					$19 50	
Postage and telegraph					1 50	
Miscellaneous					3 20	
						24 20
Total expenses Black River canal						$1,375 99

ORDINARY REPAIRS.—CAYUGA AND SENECA CANAL.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
H. T. Beach	Division engineer	....	$2,400 00 per annum	$135 00	....	$135 00
R. R. Stuart	Division engineer	....	2,400 00 per annum	45 00	....	45 00
D. E. Whitford	Resident engineer	....	2,000 00 per annum	130 00	$10 51	140 51
R. R. Stuart	Assistant engineer in charge	4	6 00 per day	24 00	....	24 00
R. R. Stuart	Assistant engineer	13	5 00 per day	65 00	....	65 00
J. M. Farle	Assistant engineer	17	5 00 per day	85 00	50 30	135 30
Chas. A. Cockroft	Leveler	13	4 50 per day	58 50	27 75	86 25
Henry Blum	Chainman	2	4 00 per day	8 00	6 58	14 58
T. V. Owens	Chainman	6	2 50 per day	15 00	3 23	18 23
Total expenses Cayuga and Seneca Canals						$663 87

SURVEYS FOR STATE BOARD OF CLAIMS — ERIE CANAL.

Chapter 295, *Laws of* 1890.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
Charles G. Witbeck	Assistant engineer in charge	9	$6 00 per day	$54 00	$8 92	$62 92

IMPROVING SANITARY CONDITION OF THE OLD ABANDONED ERIE CANAL AT ROME, N. Y.

Chapter 385, *Laws of* 1890.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
Charles G. Whitbeck	Assistant engineer in charge	5	$6 00 per day	$30 00	$19 12	$49 12
Theo. A. Hendrickson	Rodman	4	3 50 per day	14 00	9 11	23 11
						$72 23
Incidental expenses.						
Miscellaneous						2 20
Total improving sanitary condition, etc						$74 43

SWING BRIDGE NEAR SCHUYLER STREET, UTICA.

Chapter 69, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
D. E. Whitford	Resident engineer	3	$2,000 00 per annum	$16 44	$5 32	$21 76
A. C. Driscoll	Leveler	13	4 50 per day	58 50	23 70	82 20
Theo. A. Hendrickson	Rodman	8	3 50 per day	28 00	21 06	49 06
T. V. Owens	Chainman	15	2 50 per day	37 50	27 80	65 30
						$218 32
Incidental expenses.						
Fuel					$1 45	
Postage and telegraph					50	
Miscellaneous					1 47	
						3 42
Total swing bridge, etc., Utica, N. Y						$221 74

CULVERT UNDER ERIE CANAL AT WEST UTICA, N. Y.

Chapter 199, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
H. T. Beach	Division engineer	4	$2,400 00 per annum	$26 30	$8 43	$34 73
D. E. Whitford	Resident engineer	8	2,000 00 per annum	43 84	16 27	60 11
A. C. Driscoll	Leveler	20	4 50 per day	90 00	10 53	100 53
						$195 37
Incidental expenses.						
Stationery					$0 50	
Postage and telegraph					50	
Miscellaneous					50	
						1 50
Total culvert, etc., at West Utica, N. Y.						$196 87

SURVEYS STATE BOARD OF CLAIMS — ERIE CANAL.

Chapter 356, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
D E. Whitford	Resident engineer	1	$2,000 00 per annum	$5 48	$2 16	$7 64
H. T. Beach	Engineer Board of Claims	2	10 00 per day	20 00	2 98	22 98
Charles G. Whitbeck	Assistant engineer in charge	14	6 00 per day	84 00	35 84	119 84
Charles G. Whitbeck	Assistant engineer	13	5 00 per day	65 00	17 94	82 94
A. C. Driscoll	Leveler	1	4 50 per day	4 50	3 16	7 66
T. A. Hendrickson	Rodman	3	3 50 per day	10 50	10 48	20 98
						$262 04
Incidental expenses.						
Postage and telegraph					$0 35	
Miscellaneous					2 60	
						2 95
Total surveys, etc., Erie canal						$264 99

Bridge over Erie Canal at South Madison Street, Rome, N. Y.

Chapter 601, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
D. E. Whitford	Resident engineer	1	$2,000 00 per annum	$5 48	$2 06	$7 54
A. C. Driscoll	Leveler	5	4 50 per day	22 50	2 06	24 56
						$32 10
Incidental expenses.						
Miscellaneous					$90 00	90 00
Total bridge at South Madison street, Rome						$122 10

Wall Between the Oswego Canal and River in the City of Oswego.

Chapter 226, *Laws of* 1891.

NAME.	Bank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
R. R. Stuart	Assistant engineer in charge	12	$6 00 per day	$72 00	$24 80	$96 80
Incidental expenses.						
Postage and telegraph					$2 10	
Miscellaneous					1 00	
						3 10
Total wall at Oswego						$99 90

SURVEYS STATE BOARD OF CLAIMS — OSWEGO CANAL.

Chapter 356, *Laws of* 1892.

NAME	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
D. E. Whitford	Resident engineer	1	$2,000 00 per annum	$5 48	....	$5 48
H. T. Beach	Engineer Board of Claims	74½	10 00 per day	745 00	$421 03	1,166 03
T. A. Hendrickson	Leveler	51	4 50 per day	229 50	72 40	301 90
Paul L. Schultze	Leveler	22	4 50 per day	99 00	20 90	119 90
T. A. Hendrickson	Rodman	4	3 50 per day	14 00	....	14 00
Thos. J. Welch	Chainman	1	2 50 per day	2 50	....	2 50
Edward J. Berry	Chainman	1	2 50 per day	2 50	....	2 50
James Spaulding	Chainman	48	2 50 per day	120 00	....	120 00
David C Strong	Chainman	48	2 50 per day	120 00	....	120 00
J. H. McLaughlin	Chainman	46	2 50 per day	115 00	....	115 00
Warren R. Borst	Chainman	22	2 50 per day	55 00	70	55 70
John Dillmore	Chainman	23	2 50 per day	57 50	....	57 50
						$2,080 51
	Incidental expenses.					
Labor					$89 00	
Stationery					35 55	
Postage and telegraph					4 28	
Miscellaneous					71 95	200 78
Total surveys, etc., Oswego canal						$2,281 29

CLEARING RESERVOIR FORESTPORT DAM.

Chap. 342, *Laws of* 1891.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
D. E. Whitford	Resident engineer	34	$2,000 00 per annum	$186 30	$70 39	$256 69
R R Stuart	Assistant engineer in charge	7	6 00 per day	42 00	20 20	62 20
A. C. Driscoll	Leveler	63	4 50 per day	283 50	34 04	317 54
Theodore A. Hendrickson	Rodman	12	3 50 per day	42 00	33 30	75 30
N. E. Whitford	Rodman	43	3 50 per day	150 50	10 55	161 05
T. V. Owens	Chainman	45	2 50 per day	112 50	20 40	132 90
M. J. Rosa	Chainman	45	2 50 per day	112 50	17 25	129 75
Thomas J. Welch	Chainman	1	2 50 per day	2 50	....	2 50
Ed. J. Berry	Chainman	2	2 50 per day	5 00	2 50	7 50
						$1,145 43
Incidental expenses.						
Labor					$32 25	
Stationery					4 50	
Livery					111 00	
Postage and telegraph					1 22	
Miscellaneous					5 55	
						154 52
Total clearing reservoir, etc						$1,299 95

Wall along the Black River Canal at Rome.

Chapter 271, *Laws of* 1892.

NAME.	Rank..	Number of days.	Rate of Compensation.	Salary.	Travel.	Totals.
R. R. Stuart	Division engineer	1	$2,400 00 per annum..	$6 58	$2 06	$8 64
D. E. Whitford	Resident engineer	5	2,000 00 per annum..	27 40	4 02	31 42
T. V. Owens	Chainman	1	2 50 per day	2 50	2 06	4 56
E. J. Berry	Chainman	2	2 50 per day	5 00	2 06	7 06
Total wall at Rome, etc						$51 68

Surveys — State Board of Claims.

Chapter 356, *Laws of* 1892.

BLACK RIVER CANAL.

MAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
H. T. Beach	Engineer board of claims	1	$10 00 per day	$10 00	$2 06	$12 06
	Incidental expenses.					
Postage and telegraph					$0 40	40
Total surveys, etc., Black River canal						$12 46

RAISING TREE DAM ON THE BEAVER RIVER AT STILLWATER.

Chapter 469, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
R. R. Stuart	Division engineer	8	$2,400 00 per annum	$52 60	$81 40	$134 00
D. E. Whitford	Resident engineer	7	2,000 00 per annum	38 36	....	38 36
D. R. Lee	Assistant engineer, in charge	17	6 00 per day	102 00	16 54	118 54
A. C. Driscoll	Assistant engineer	10	5 00 per day	50 00	12 20	62 20
T. A. Hendrickson	Leveler	4	4 50 per day	18 00	....	18 00
Paul L. Schultze	Leveler	6	4 50 per day	27 00	....	27 00
M. J. Rosa	Rodman	17	3 50 per day	59 50	4 27	63 77
						$461 87
	Incidental expenses.					
Labor					$6 00	
Stationery					14 75	
Office rent					6 00	
Postage and telegraph					3 20	
Miscellaneous					19 66	
						49 61
Total, Beaver river dam, etc.						$511 48

COMPLETION OF DAM ABOVE FORESTPORT POND.

Chapter 494, *Laws of* 1892.

NAME.	Rank.	Number of days	Rate of compensation.	Salary.	Travel.	Totals.
R. R. Stuart	Division engineer	14	$2,400 00 per annum	$92 06	$50 95	$143 01
D. E. Whitford	Resident engineer	25	2,000 00 per annum	136 99	35 56	172 55
A C. Driscoll	Assistant engineer in charge	28	6 00 per day	168 00	53 40	221 40
A. C. Driscoll	Assistant engineer	10	5 00 per day	50 00	....	50 00
A. C. Driscoll	Leveler	14	4 50 per day	63 00	7 72	70 72
T. A. Hendrickson	Leveler	7	4 50 per day	31 50	5 10	36 60
Paul L. Schultze	Leveler	8	4 50 per day	36 00	12 22	48 22
T. V. Owens	Chainman	30	2 50 per day	75 00	39 12	114 12
Thomas J. Welch	Chainman	29	2 50 per day	72 50	21 63	94 13
Edward J. Berry	Chainman	29	2 50 per day	72 50	19 50	92 00
						$1,042 75
Incidental expenses.						
Labor					$40 00	
Stationery					12 00	
Office rent					12 00	
Postage and telegraph					4 66	
Miscellaneous					30 59	
						99 25
Total Forestport dam, etc						$1,142 00

RAISING ROADS AND BRIDGES ON THE BLACK RIVER.

Chapter 494, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel	Totals.
D. E. Whitford	Resident engineer	7	$2,000 00 per annum	$38 36	$9 47	$47 83
A. C. Driscoll	Assistant engineer in charge	15	6 00 per day	90 00	....	90 00
Paul L. Schultze	Leveler	8	4 50 per day	36 00	....	36 00
Thomas J. Welch	Chainman	26	2 50 per day	65 00	2 48	67 48
William J. Hynes	Chainman	17	2 50 per day	42 50	....	42 50
						$283 76
Incidental expenses.						
Labor					$2 00	
Stationery					9 00	
Livery					72 00	
Postage and telegraph					1 00	
						84 00
Total raising roads and bridges, etc						$367 76

DREDGING CAYUGA INLET — CAYUGA AND SENECA CANAL.

Chapter 234, *Laws of* 1892.

NAME.	Rank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
R. R. Stuart	Division engineer	2	$2,400 00 per annum	$13 15	$6 48	$19 68
D. E. Whitford	Resident engineer	2	2.000 00 per annum	10 96	6 13	17 09
T. V. Owens	Chainman	4	2 50 per day	10 00	7 91	17 91
E. J. Berry	Chainman	3	2 50 per day	7 50	6 58	14 08
						$68 71
Incidental expenses.						
Miscellaneous						1 00
Total Cayuga inlet						$69 71

REPAIRING EMBANKMENT OF MAD BROOK AT SHERBURNE.

Chapter 249, *Laws of* 1892.

NAME.	Bank.	Number of days.	Rate of compensation.	Salary.	Travel.	Totals.
R. R. Stuart	Division engineer	2	$2,400 00 per annum	$ 3 15	$12 98	$26 13
D. E. Whitford	Resident engineer	11	2,000 00 per annum	60 28	18 73	78 01
A. C. Driscoll	Assistant engineer	9	5 00 per day	45 00	9 24	54 24
Paul L. Schultze	Leveler	30	4 50 per day	135 00	34 39	169 39
T. V. Owens	Chainman	6	2 50 per day	15 00	10 67	25 67
Thomas J. Welch	Chainman	3	2 50 per day	7 50	9 24	16 74
Edward J. Berry	Chainman	6	2 50 per day	15 00	11 67	26 67
Warren R. Borst	Chainman	6	2 50 per day	15 00	11 73	26 78
						$423 58
Incidental expenses.						
Stationery					$8 65	
Office rent					3 75	
Postage and telegraph					32	
Miscellaneous					9 10	21 82
Total embankment at Sherburne						$445 40

SUMMARY.

ITEMS.	AUTHORIZED BY		Amounts.	Totals.
	Chap.	Year.		
ORDINARY REPAIRS.	129	1891	....	
Erie canal	......	......	$7,883 35	
Oswego canal	......	......	1,445 01	
Black River canal	......	......	1,3[illegible]5 99	
Cayuga and Seneca canal	......	......	663 87	
Total ordinary repairs	......	......	$10,868 22	$10,868 22
EXTRAORDINARY REPAIRS.				
Erie Canal.				
Surveys, State Board of Claims	295	1890	$62 92	
Improving sanitary condition of old Erie canal at Rome	385	1890	74 43	
Swing bridge near Schuyler street, Utica	69	1891	221 74	
Culvert under Erie canal at West Utica	199	1891	196 87	
Surveys, State Board of Claims	56	1892	264 99	
Bridge over Erie canal at South Madison street, Rome	601	1892	122 10	
Total Erie canal	......	......	$943 05	943 05
Oswego Canal.				
Wall between the Oswego canal and Oswego river, in the city of Oswego	226	1891	$99 90	
Surveys, State Board of Claims	356	1892	2,281 29	
Total Oswego canal	......	......	$2,381 19	2,381 19
Black River Canal				
Clearing reservoir, Forestport dam	342	1891	$1,299 95	
Wall along Black River canal at Rome	27[illegible]	1892	51 68	
Surveys State Board of Claims	356	1892	12 46	
Raising three dams on the Beaver river at Stillwater	469	1892	511 48	
Completion of dam above Forestport pond	494	1892	1,142 00	
Raising roads and bridges on the Black river	494	1892	367 76	
Total Black River canal			$3,385 33	3,385 33
Cayuga and Seneca Canal.				
Dredging Cayuga inlet	234	1892	$69 71	69 71
Miscellaneous.				
Repairing embankment of Mad brook, Sherburne	249	1892	$445 40	445 40
Total engineering for fiscal year ending September 30, 1892				$18,092 90

TABLE No. 2.

Statement of work done under contract upon the middle division of the New York State canals for the fiscal year ending September 30, 1892.

ERIE CANAL.

CHARACTER OF WORK.	Authorized by		Appropriations.		When let.		When to be completed.	
	Chapter	Laws						
Substructure for swing-bridge near Schuyler street, Utica	69	1891	Part of	$5,250 00	Aug.	19, 1891	Feb.	1, 1892
Superstructure for swing-bridge near Schuyler street, Utica	69	1891	Part of	5,250 00	Aug,	19, 1891	April	1, 1892
Sidewalks on Depuyster street bridge, Rome	241	1891		1,000 00	July	27, 1891	Oct.	1, 1891
Culvert under Erie canal at West Utica	199	1892		4,500 00	April	11, 1892	April	28, 1892
Wrought-iron bridge over the Erie canal, Madison street, Rome	601	1892		5,000 00	July	20, 1892	....	
BLACK RIVER CANAL.								
Completion of the reservoir dam above Forestport pond	494	1892		35,000 00	July	20, 1892	Dec.	1, 1892
Raising roads and bridges on Black River reservoir above Forestport pond	494	1892		14,000 00	July	20, 1892	Dec.	1, 1892
Clearing flowed grounds of the reservoir on Black river above Forestport pond	342	1891		15,000 00	July	20, 1892	Feb.	1, 1893
Reservoir dam above Forestport pond	274	1889		45,000 00	Aug.	8, 1889	Oct.	15, 1889
MISCELLANEOUS.								
Repairing State embankment of Mad brook at Sherburne, N. Y	249	1892		10,000 00	Aug.	30, 1892	Dec.	1, 1892
Raising dam on Beaver river at Stillwater, N. Y	469	1892		15,500 00	Aug.	30, 1892	Dec.	1, 1892

TABLE NO. 2 — *Statement of work under contract upon the middle division, etc.*— (Concluded).

ERIE CANAL.

CHARACTER OF WORK.	Engineer's estimate exclusive of engineering.	Estimated cost at contract prices.	Amount done during fiscal year.	Total amount done.	Remarks.
Substructure for swing-bridge near Schuyler street, Utica	$2,352 60	$2,572 75	$2,687 22	$2,687 22	Final rendered.
Superstructure for swing-bridge near Schuyler street, Utica	2,000 00	1,900 00	1,913 41	1,913 41	Final rendered.
Sidewalks on Depuyster street bridge, Rome	861 50	850 00	850 00	850 00	Final rendered.
Culvert under Erie canal at West Utica	3,600 00	3,457 00	3,349 01	3,349 01	Final rendered.
Wrought-iron bridge over the Erie canal, Madison street, Rome	4,350 00	3,800 00	....	....	Nothing done.
BLACK RIVER CANAL.					
Completion of the reservoir dam above Forestport pond	30,815 00	30,780 00	2,000 00	2,000 00	In progress.
Raising roads and bridges on Black River reservoir above Forestport pond	11,835 00	11,902 50	2,440 00	2,440 00	In progress.
Clearing flowed grounds of the reservoir on Black river above Forestport pond	12,500 00	11,000 00	1,140 00	1,140 00	In progress.
Reservoir dam above Forestport pond	64,635 00	44,847 50	5 07	39,505 07	Final rendered.
MISCELLANEOUS.					
Repairing State embankment of Mad brook at Sherburne, N. Y	8,137 50	7,442 00	1,140 00	1,140 00	In progress.
Raising dam on Beaver river at Stillwater, N. Y.	18,575 00	18,220 00	779 00	779 00	In progress.

TABLE No. 3.

Water record of Cayuga and Cross lakes and Seneca river, as per concurrent resolution of 1884.

(Water surface given below datum line.)

LOCATION.	Bench-mark number.	Miles from Cayuga lock.	1884.				1885.					
			AUGUST 5, 6 and 7.		DECEMBER 2, 3 and 4.		MARCH 4, 5, 6 and 7.		AUGUST 6 and 7.		DECEMBER 2, 3 and 4.	
			WATER.		WATER.		WATER.		WATER.		WATER.	
			Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.
Cayuga lake	1	0	— 8.59	10.49	—10.11	8.97	—10.00	9.08	— 9.33	9.75	— 8.78	10.30
Mud lock	2	1⅛	— 8.80	10.42	—10.22	9.00	—10.17	9.05	— 9.54	9.68	— 8.91	10.31
Canandaigua river, south of canal	....	6½	—11.20	5.60	—12.68	4.00	—12.54	4.60	—11.93	5.20	—11.09	6.10
Aqueduct	3	6½	—11.42	7.03	—12.98	5.47	—12.66	5.70	—12.19	6.20	—11.26	7.10
Canandaigua river, north of canal	....	6½	—11.58	5.40	—13.01	4.00	—12.83	4.90	—12.48	5.20	—11.48	6.20
West Shore railroad crossing	4	9	—11.85	3.75	—13.20	2.40	—12.70	2.80	—12.87	2.60	—11.48	3.60
			....	7.80	....	6.50	....	7.70	....	7.50	....	8.50
N. Y. C. and H. R. R. R. crossing	5	10	—12.41	4.80	—14.19	3.00	—13.48	3.90	—13.48	3.90	—12.66	4.70
Mosquito Point	6	15¼	—15.92	0.10	—16.81	*	—16.70	*	—16.04	*	—14.23	1.80
			....	7.20	....	6.30	....	6.40	....	7.10	....	8.90
Cross lake	7	25	—17.32	19.20	—17.55	19.00	—18.00	18.50	—17.85	18.70	—15.38	21.10

* Above water.

TABLE NO. 3 — *Water record of Cayuga and Cross lakes and Seneca river, etc.* — (Continued.)

LOCATION.	1886.						1887.						1888.					
	MARCH 8 AND 9.		AUGUST 5, 6 AND 7.		DECEMBER 7.		MARCH 4.		AUGUST 5.		DECEMBER 2.		MARCH 2.		AUGUST 6.		DECEMBER 3 AND 4.	
	WATER.		WATER.		WATER.		WATER.		WATER.		WATER.		WATER.		WATER.		WATER.	
	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.
Cayuga lake	— 8.11	10.97	— 8.49	10.59	— 8.33	10.75	— 6.82	12.39	— 8.22	10.86	— 9.75	9.33	— 9.00	10.08	— 8.88	10.20	— 9.28	9.80
Mud lock	— 8.26	10.96	— 8.76	10.46	— 8.46	10.76	— 6.82	12.40	— 8.35	10.87	— 9.97	9.25	— 9.11	10.11	— 9.09	10.13	— 9.48	9.74
Canandaigua river, south of canal	— 9.61	7.60	—11.88	5.40	—10.20	7.00	— 7.89	9.30	—10.87	6.30	....	.....	—10.14	7.00	—11.42	5.7	—10.66	6.5
Aqueduct	— 9.72	8.70	—12.12	6.30	—10.35	8.10	— 8.14	10.30	—11.09	7.30	—12.42	6.00	—10.26	8.1	—11.63	6.8	—10.84	7.6
Canandaigua river, north of canal	— 9.93	7.80	—12.24	5.40	—10.59	7.10	— 8.30	9.40	—11.51	6.20	—12.64	5.1	—10.57	7.2	—11.98	5.7	—11.12	6.6
W. S. R. R. crossing	—10.24	5.20	—12.76	2.70	—10.79	4.50	— 8.82	6.70	—12.00	3.50	—12.91	2.6	—10.95	4.5	—12.29	3.2	—11.35	4.1
	....	10.50	....	7,60	....	9.40	....	11.60	....	8.40	....	7.5	....	9.4	....	8.1	....	9.0
N. Y. C. and H. R. R. R. crossing	—10.74	6.60	—13.31	4.00	—11.61	5.70	— 9.18	8.10	—12.55	4.80	—13.67	3.7	—11.45	5.9	—13.00	4.4	—12.19	5.2
Mosquito Point	—12.15	4.00	—16.26	*	—13.39	2.60	—10.52	5.50	—15.41	0.60	—16.57	*	—13.22	2.8	—15.63	0.4	—14.69	1.3
	....	11.00	....	7.00	....	9.70	....	12.60	....	7.70	....	6.5	....	9.9	....	7.5	....	8.4
Cross lake	—14.01	22.50	—17.71	18.80	—15.39	21.10	—12.09	24.40	—17.17	19.30	—17.42	19.1	—14.53	2.2	—17.40	19.1	—14.83	21.67

* Above water.

TABLE NO. 3 — *Water record of Cayuga and Cross lakes and Seneca river, etc.*— (Continued).

LOCATION.	1889.						1890.					
	MARCH 5 AND 6.		AUGUST 5.		DEC. 4 AND 5.		MARCH 6 AND 7.		AUGUST 8.		DEC. 4 AND 5.	
	WATER.		WATER.		WATER.		WATER.		WATER.		WATER.	
	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.
Cayuga lake	— 8.93	10.15	— 6.92	12.16	— 6.56	12.52	— 7.41	11.67	— 7.47	11.61	— 7.46	11.62
Mud lock	— 9.04	10.18	— 7.00	12.22	— 6.96	12.26	— 7.55	11.67	— 7.67	11.55	— 7.60	11.62
Canandaigua river, south of canal	— 9.88	7.26	— 8.82	8.3	— 8.29	8.8	— 8.92	8.2	—10.51	6.6	— 9.46	7.7
Aqueduct	—10.07	8.29	— 9.03	9.4	— 8.56	9.9	— 9.23	9.2	—10.78	7.6	— 9.79	8.6
Canandaigua river, north of canal................	—10.28	7.44	— 9.33	8.4	— 8.73	9.0	— 9.27	8.4	—11.23	6.5	— 9.98	7.7
West Shore R. R. crossing........................	—10.47	5.0	— 9.84	5.7	— 8.74	6.8	— 9.75	5.8	—11.50	4.0	—10.34	5.2
	....	9.9	....	10.6	....	11.7	....	10.7	....	8.9	....	10.1
New York Cent. and Hudson River R. R. crossing.	—10.97	6.4	—10.47	7.0	— 9.17	8.2	— 9.78	7.6	—12.31	5.1	—10.61	6.8
Mosquito point	—12.25	3.8	—12.92	3.1	—10.59	5.4	—10.91	5.1	—15.16	0.8	—11.33	4.7
	....	10.9	....	10.2	....	12.5	....	12.2	....	7.9	....	11.8
Cross lake	—14.13	22.4	—13.32	23.2	—11.75	24.8	—12.95	23.6	—16.23	20.3	—13.37	23.1

TABLE No. 3 — *Water record of Cayuga and Cross lakes and Seneca river* — (Concluded).

LOCATION.	1891.						1892.				Remarks.
	MARCH 3 AND 6.		AUGUST 3 AND 4.		DEC. 9 AND 10.		MARCH 7 AND 10.		AUGUST 4.		
	WATER.		WATER.		WATER.		WATER.		WATER.		
	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	Surface.	Depth.	
Cayuga lake	— 5.89	13.19	— 8.96	10.12	— 9.52	9.56	— 8.67	10.41	— 7.69	11.39	Depth on lock miter-sill.
Mud lock	— 5.96	13.26	— 9.27	9.95	— 9.66	9.56	— 8.79	10.43	— 7.85	11.35	Depth on miter-sill.
Canandaigua river, south of canal	— 7.16	10.0	—12.69	4.4	—12.12	5.0	—10.55	6.5	— 9.56	7.5	Depth of river.
Aqueduct	— 7.48	10.9	—12.71	5.7	—12.30	6.1	—10.80	7.6	—11.05	7.4	Depth on aqueduct foundation.
Canandaigua river, north of canal	— 7.45	10.2	—12.97	4.7	—12.46	5.2	—11.06	6.6	—11.28	6.4	Depth of river.
West Shore R. R. crossing	— 7.65	6.0	—13.29	2.3	—12.66	2.9	—10.77	4.8	—11.66	4.5	Depth on natural bed.
	....	12.8	....	7.1	....	7.7	....	9.6	....	8.7	Depth in channel dredged.
N. Y. C. and H. R. R. R. crossing	— .84	7.9	—13.92	3.5	—13.63	3.8	—11.31	5.7	—12.12	3.3	Depth on bridge foundation.
Mosquito point	— 8.64	7.4	—16.70	Bed dry	—15.47	0.5	—12.96	3.0	—14.91	1.1	Depth on natural bed.
	....	14.5	....	6.4	....	7.6	....	10.1	....	8.2	Depth in channel dredged.
Cross lake	—10.4	26.0	—17.48	19.0	—16.22	12.08	—13.75	22.7	—16.56	20.0	Depth at iron bridge.

TABLE

Showing the location of the structures on the Erie canal, from the east line
between them

[N. B.—Numbers omitted represent

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			FRANKFORT LEVEL, $3\frac{356}{1000}$ MILES.
......	0.00	0.00	East line of Oneida county
1	0.04	3.13	Greene's road bridge (Cooper)
C. 1	.....	44.72	Stone culvert, three arches
2	0.70	8.01	Starch factory bridge
.....	.....	.....	Railroad swing-bridge (Hatfield switch)
C. 2	.....	39.94	Stone culvert, three-feet arch
......	.....	.....	Mohawk cotton factory bridge (private)
3	1.58	30.55	Clay street bridge, Utica
B. H. 1	.....	26.75	Ballou creek bulkhead and waste-weir
4	2.06	11.32	Broad street bridge, Utica (Whipple arch)
5	.....	7.45	Catharine street bridge, Utica (Swartz suspension)
......	.....	.....	Pipe culvert (city)
6	.....	9.23	First street bridge, Utica (Whipple arch)
7	2.37	8.30	John street lift-bridge, Utica
......	.....	1.83	Weigh-lock building
8	2.50	8.81	Genesee street bridge, Utica (Whipple arch)
9	.....	3.10	Hotel street lift-bridge, Utica
10	.....	3.26	Seneca street bridge, Utica (Whipple arch).
11	.....	5.17	Washington street bridge, Utica
12	.....	4.74	Broadway foot-bridge, Utica
13	.....	10.97	Cornelia street foot-bridge, Utica (iron chord)
......	.....	.....	Pipe culvert at State street, Utica (city)
......	.....	.....	Chenango canal junction
14	3.00	12.62	Whitesboro street bridge, Utica
......	.....	3.25	Midland railroad swing-bridge, Utica
15	.....	8.49	Breese street foot-bridge, Utica
C. 3	.....	10.57	Stone arch culvert at Nail creek, ten-feet chord
......	.....	.....	Pipe culvert, four feet diameter (city)
......	.....	4.75	Del., Lack. and Western Railroad swing-bridge, Utica (plate girder)
......	3.36	1.52	Foot of Lock No. 46
			ROME LEVEL, $55\frac{957}{1000}$ MILES.
			Lock No. 46, three-feet lift, westward
16	.....	2.17	Schuyler street bridge, Utica (Whipple arch)
16½	.....	2.06	Schuyler street swing bridge, Utica

No. 4.

of Oneida county to the south line of Wayne county, with the distances as follows:

structures abandoned.]

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	......	......	....	......	....	......	....	....
Iron..	......	$71\frac{4}{12}$	1	$17\frac{11}{12}$	....	......	....	1881
......	......	......	....	......	....	......	....	1891
......	Wood	$80\frac{10}{12}$	2	13	....	......	19° 10′ R	1884
......	Iron .	......	....	......	....	......	....	1890
......	......	......	....	......	....	......	....	....
......	Iron .	84	....	......	1	7	....	....
......	Iron .	$72\frac{8}{12}$	1	$14\frac{4}{12}$	....	......	30° R	1879
......	......	......	....	......	....	......	....	1892
Iron..	......	$91\frac{1}{12}$	2	$15\frac{6}{12}$	2	$7\frac{7}{12}$	33° 20′ L	1889
Iron..	......	$72\frac{10}{12}$	1	$18\frac{9}{12}$	2	$7\frac{6}{12}$	....	1885
......	......	......	....	......	....	......	....	...
Iron..	......	$77\frac{11}{12}$	1	$17\frac{6}{12}$	....	......	....	1881
......	Iron .	$74\frac{8}{12}$	1	24	2	$5\frac{6}{12}$	3° 55′ R	1888
......	......	......	....	......	....	......	....	....
Iron..	......	$82\frac{1}{12}$	2	$18\frac{10}{12}$	2	$17\frac{10}{12}$ $17\frac{7}{12}$	28°15′R	1890
......	Iron .	72	1	$19\frac{6}{12}$	1	$3\frac{7}{12}$	....	1884
Iron..	......	$72\frac{6}{12}$	1	$19\frac{6}{12}$	2	$7\frac{6}{12}$	3° 20′ R	1879
Iron..	......	$73\frac{1}{12}$	1	$18\frac{6}{12}$	2	$6\frac{6}{12}$ 7	3° 40′ R	1879
......	Iron .	$70\frac{6}{12}$	....	......	1	$8\frac{4}{12}$	9° 10′	1870
......	Wood	$72\frac{4}{12}$	....	......	1	9	....	1882
......	......	......	....	......	....	......	....	....
......	......	.....	....	......	....	......	....	....
......	Iron .	$88\frac{8}{12}$	2	$16\frac{6}{12}$	2	$8\frac{10}{12}$	33° 40′ R	1890
......	Iron .	$63\frac{9}{12}$	1	$14\frac{3}{12}$	....	......	....	....
......	Iron .	......	....	......	1	......	....	1892
......	......	......	....	......	....	......	....	1882
......	.....	......	....	......	....	......	....	....
......	Iron .	$89\frac{4}{12}$	1	14	....	......	....	....
......	......	......	....	......	....	......	....	1889
Iron..	......	$79\frac{2}{12}$	1	16	2	$6\frac{6}{12}$	0° 37′ R	....
......	Iron .	$75\frac{4}{12}$	1	18	....	6	....	1892

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			ROME LEVEL — (*Continued*).
17	3 70	25.15	Platt street foot-bridge, Utica.............
C. 4	.....	58.34	Composite culvert, 2x2 feet...............
19	4.64	16.81	Whitesboro road bridge (Bollman)........
C. 5	.....	2.20	Box culvert, 2x2 feet....................
C. 5½	.....	.....	Cast-iron pipes, 4 feet diameter...........
C. 6	.....	25.48	Composite drop culvert, 3x3 feet..........
20	5.36	29.91	Yorkville road-bridge (riveted)............
C. 7	.....	8.04	Double arch culvert, ten-feet chord........
A. 1	.....	15.88	Sauquoit creek aqueduct, three spans, twenty-two feet each, stone abutments and pier..............................
21	6.12	37.52	Clinton street bridge, Whitesboro (Whipple arch)....................................
.....	.....	.....	Babbit's foot-bridge......................
22	.....	26.00	Westmoreland street bridge (Whipple arch)
23	.....	7.25	Suspension foot-bridge..................
C. 8	.....	14.67	Composite drop culvert, two openings, 2x2½ feet each............................
24	6.84	9.45	Watkins street bridge..................
C. 9	.....	14.03	Composite drop culvert, 2½x2½ feet........
C. 10	.....	19.50	Composite drop culvert, 2x2 feet..........
25	7.63	29.22	Bradley road-bridge (Whipple arch).......
26	8.78	92.07	Even's farm bridge.....................
27	9.19	32.74	Christman's farm bridge..................
......	.....	1.40	Oriskany feeder. The dam and bulkhead of this feeder is located 46$\frac{60}{100}$ chains south of canal............................
A. 2	.....	10.63	Oriskany aqueduct, four spans, twenty-two feet each, stone abutments and piers.....
28	9.51	13.82	River street bridge, Oriskany (Whipple arch)
C. 11	.....	6.62	Arch culvert, twelve-feet chord............
29	10.36	61.33	Brainard's farm bridge...................
30	.....	21.33	Parkhurst's farm bridge (iron chords)......
31	11.11	38.89	Kirley's farm bridge (iron chords)... .....
C. 12	.....	21.03	Composite culvert, three openings, 3x2½ feet each...........................
32	12.34	76.96	Murphy's road-bridge....................
B. H. 2	13.51	93.06	Bulkhead and waste-weir and spillway.....
33	.....	10.66	Clark's farm bridge.....................
34	15.63	159.43	Stanwix road bridge (Whipple arch).......
C. 13	.....	25.31	Whitehall composite culvert, four openings, 3x4 feet each........................
34½	.....	65	Road bridge on berme side...............
35	16.03	5.37	Greenfield road-bridge (Whipple arch).....

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Iron.	$115\frac{4}{12}$	....	......	1	12	....	1886
......	.....	......	....	......	....	......	....	....
......	Iron.	$71\frac{4}{12}$	2	$15\frac{1}{12}$	....	......	....	1885
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1892
......	.....	......	....	......	....	......	....	....
......	Iron.	$79\frac{5}{12}$	1	$21\frac{7}{12}$	2	$7\frac{6}{12}$	22° 55′ R	1889
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron..	.....	$79\frac{7}{12}$	1	19	1	$4\frac{7}{12}$	26° 10′ L	1886
......	Iron.	$88\frac{4}{12}$	....	......	1	$6\frac{4}{12}$	....	....
Iron..	.....	$80\frac{2}{12}$	1	$18\frac{3}{12}$	2	$5\frac{4}{12}$	3° 55′ R	....
......	Iron.	$104\frac{8}{12}$	....	......	1	6	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{10}{12}$	1	13	....	......	1° 25′ R	1881
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron..	.....	$71\frac{1}{12}$	1	$17\frac{11}{12}$	....	......	....	1890
......	Wood	$71\frac{1}{12}$	1	13	....	......	....	1884
......	Wood	$70\frac{4}{12}$	1	13	....	......	....	1890
......	.....	......	....	......	....	......	....	1883
......	.....	......	....	......	....	......	....	....
Iron..	.....	80	1	$18\frac{1}{12}$	2	$5\frac{7}{12}$	22° 50′ L	1881
......	.....	......	....	......	....	......	....	....
......	Wood	$72\frac{2}{12}$	1	13	....	......	....	1886
......	Wood	71	1	$12\frac{10}{12}$	....	......	....	1885
......	Wood	71	1	$12\frac{10}{12}$	....	......	....	1881
......	.....	......	....	......	....	......	....	1885
......	Wood	$72\frac{3}{12}$	1	13	....	......	....	....
......	.....	......	....	......	....	......	....	1892
......	Wood	$71\frac{8}{12}$	1	$13\frac{2}{12}$	....	......	....	1884
Iron..	.....	$80\frac{4}{12}$	1	$19\frac{6}{12}$	2	$6\frac{5}{12}$	27° 10′ L	1881
......	.....	......	....	......	....	......	....	1878
......	Wood	$40\frac{8}{12}$	1	$14\frac{4}{12}$	....	......	....	1890
Iron..	.....	$71\frac{10}{12}$	1	$14\frac{1}{12}$	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			ROME LEVEL — (*Continued*).
35¼	.....	40.28	Tow-path bridge (stringer) over old feeder.
35½	.....	45.24	Stone arch bridge — Mohawk feeder. The dam is located $7\frac{50}{100}$ chains below feeder, north of canal
35¾	.....	.....	Tow-path stringer-bridge over feeder
36	17.12	2.20	DePuyster street bridge, Rome (Whipple arch)
......	.....	10.86	N. Y. C. and H. R. R. R. bridge, lattice
......	.....	0.44	N. Y. C. and H. R. R. R. bridge, Howe riveted
36½	.....	1.50	Tubular tow-path bridge, Rome
37	17.35	5.84	James street bridge, Rome (Whipple arch).
38	.....	10.27	Washington street bridge, Rome (Whipple arch
39	.....	10.85	George street bridge, Rome (Whipple arch)
40	17.89	21.40	Jay street bridge, Rome (Bollman)
40½	.....	14.00	Tow-path bridge over Wood creek (stringer)
41	.....	1.04	Private foot bridge
42	18.41	26.79	Doxtator avenue bridge (iron chords)
......	.....	20.99	Rome, Watertown and Ogdensburgh railroad bridge, pin-connection
43	.....	6.31	Barnes' farm bridge
C. 14	.....	77.33	Composite culvert
44	19.92	15.96	Brainard's farm bridge
B. H. 3	.....	24.89	Fort Bull bulkhead and waste-weir and spillway (stone)
C. 15	.....	15.29	Arch culvert, four-feet chord
C. 16	.....	81.49	Arch culvert, four-feet chord
45	21.66	17.96	Armstrong's farm bridge
C. 17	.....	21.65	Composite culvert
46	22.21	30.16	Herrig's road bridge
C. 18	.....	35.47	Arch culvert, twelve-feet chord
47	23.10	27.94	Sand's farm bridge
C. 19	.....	31.17	Arch culvert, four-feet chord
48	22.93	35.23	Tuttle's road bridge (iron chords)
C. 20	.....	16.80	Composite culvert, four-feet opening
49	24.47	26.19	Main street, New London (Whipple arch)
C. 21	.....	37.76	Composite culvert, four feet opening
C. 22	.....	30.90	Composite culvert, four-feet opening
C. 23	.....	24.67	Composite culvert, 4x4-feet opening
51	25.78	11.39	Grove Spring road bridge
52	.....	9.26	Private foot-bridge (suspension)
C. 24	.....	28.17	Composite culvert, 2x4-feet openings
53	26.43	19.74	Stacey's basin, road bridge

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Wood	22	1	$15\frac{3}{12}$	..	......	....	1883
......	.....	......	....	......	....	......	....	....
......	Wood	......	1	......	....	......	....	....
Iron ..	.....	$82\frac{4}{12}$	1	$16\frac{8}{12}$	....	......	....	1880
......	Iron .	$89\frac{6}{12}$	2	$15\frac{1}{12}$	....	......	....	1872
......	Iron .	$89\frac{6}{12}$	1	28	....	......	....	1888
Iron ..	.....	$71\frac{11}{12}$	1	$12\frac{6}{12}$	....	......	....	....
Iron ..	.....	$92\frac{1}{12}$	2	19	2	$8\frac{2}{12}$ $8\frac{6}{12}$	....	1885
Iron ..	.....	$78\frac{1}{12}$	2	$18\frac{6}{12}$ 18	2	$5\frac{7}{12}$	7° 30′ L	1890
Iron ..	.....	$71\frac{11}{12}$	1	$16\frac{6}{12}$	....	......	2° 50′ R	1870
......	Iron .	78	1	$18\frac{6}{12}$	2	$5\frac{5}{12}$	13° 40′ R	1889
......	.....	$30\frac{1}{12}$	1	$13\frac{3}{12}$	....	......	....	1885
......	Wood	$87\frac{2}{12}$	....	......	1	$6\frac{9}{12}$	....	....
......	Wood	$111\frac{8}{12}$	1	$17\frac{11}{12}$	....	......	....	....
......	Iron .	$120\frac{4}{12}$	1	$15\frac{5}{12}$	....	......	....	1876
......	Wood	$71\frac{3}{12}$	1	13	....	......	....	1885
......	.....	.....	....	......	....	......	....	....
......	Wood	$70\frac{10}{12}$	1	13	....	.....	....	1886
......	.....	.....	....	......	....	......	....	1891
......	.....	.....	....	......	....	......	....	....
......	.....	.....	....	......	....	......	....	....
......	Wood	$71\frac{4}{12}$	1	13	....	......	....	1886
......	.....	......	....	......	....	......	....	....
......	Wood	$72\frac{2}{12}$	1	$13\frac{1}{12}$	....	......	....	1885
......	.....	.....	....	......	....	......	....	....
......	Wood	$71\frac{10}{12}$	1	13	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{5}{12}$	1	$13\frac{3}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1892
Iron ..	.....	89	1	$19\frac{3}{12}$	2	6	11° 00′ L	1885
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$78\frac{1}{12}$	1	13	....	......	....	1890
......	Iron .	$88\frac{10}{12}$	....	......	1	$5\frac{9}{12}$	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$74\frac{4}{12}$	1	13	....	......	14° 40′ L	1886

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			ROME LEVEL — (*Continued*).
54	.....	14.16	Private foot-bridge (suspension)
C. 25	.....	8.69	Composite culvert, three openings
55	27.23	41.37	Happy Valley road bridge
C. 26	.....	27.35	Composite culvert, three openings
B. H. 4	.....	0.75	Waste-weir, bulkhead and spillway on berme side
56	.....	47.04	Swing-bridge over old Oneida Lake canal
57	28.24	5.14	Higginsville east road bridge
C. 27	.....	27.58	Composite culvert, three-feet openings
58	28.64	4.73	Higginsville west road bridge (Whipple arch)
C. 28	.....	21.18	Composite culvert, four-feet openings
C. 29	.....	32.05	Composite culvert, four-feet openings
59	29.54	18.63	Dunbarton road bridge
C. 30	.....	12.88	Composite culvert, four-feet openings
C. 31	.....	26.86	Composite culvert, three-feet openings
60	30.17	10.93	Durkee road bridge
C. 32	.....	39.66	Composite culvert, one opening
61	30.76	7.58	State road bridge
C. 33	.....	27.36	Composite culvert, two openings, three feet each
......	.....	3.34	Midland railroad bridge
C. 34	.....	53.89	Arch culvert, four-feet chord
C. 35	.....	9.67	Arch culvert, four-feet chord
C. 36	32.24	23.81	Brandy brook arch culvert, twelve-feet chord
62	.....	16.82	Private suspension foot-bridge
63	32.77	26.06	Durhamville east road bridge (Whipple arch)
C. 37	.....	4.76	Arch culvert four-feet chord
64	32.94	8.13	Main street bridge, Durhamville (Whipple arch)
C. 38	.....	7.69	Arch culvert, two spans, each twenty-five feet chord
B. H. 5	.....	.....	Bulkhead and waste-weir directly over the end of arch culvert
65	.....	6.47	Bennett's road bridge (iron chords)
......	.....	4.70	Oneida creek feeder. The dam and bulkhead of this feeder are located $232\frac{40}{100}$ chains south of the canal
65½	.....	2.00	Bridge over old Oneida Lake canal (stringer)
66	34.14	75.15	Shollhammer's road bridge (iron chords). The north approach of this bridge is a wooden truss over highway
A. 3	34.59	46.51	Cowassalon aqueduct, two spans, twenty feet each

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Iron .	$89\frac{6}{12}$	....	......	1	$5\frac{7}{12}$	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$70\frac{10}{12}$	1	13	....	......	1° 00′ L	1890
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$20\frac{7}{12}$	1	$16\frac{2}{12}$	....	......	....	1888
......	Wood	$73\frac{1}{12}$	1	$16\frac{9}{12}$	....	......	8° 50′ R	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{7}{12}$	1	$17\frac{9}{12}$	....	......	....	1879
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{8}{12}$	1	$17\frac{10}{12}$	....	......	....	1883
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{7}{12}$	1	16	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{2}{12}$	1	$18\frac{2}{12}$	....	......	....	1883
......	.....	......	....	......	....	......	....	....
......	Iron .	$125\frac{10}{12}$	1	$16\frac{8}{12}$	....	......	....	1890
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Iron .	$90\frac{6}{12}$	....	......	1	$6\frac{1}{12}$	....	....
Iron ..	.....	$71\frac{9}{12}$	1	$18\frac{10}{12}$	1	$6\frac{6}{12}$	....	1888
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{9}{12}$	1	19	2	$5\frac{10}{12}$	....	1886
......	.....	......	....	......	....	......	....	1891
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{9}{12}$	1	$17\frac{2}{12}$	....	......	1° 05′ R	1885
......	.....	......	....	......	....	......	....	....
......	Wood	20	1	$17\frac{5}{12}$	....	......	....	....
....	Wood	$74\frac{9}{12}$	1	$17\frac{2}{12}$	....	......	2° 30′ R	1881
......	.....	......	....	......	....	......	....	1891

TABLE No. 4 — (Continued) — *Showing the location of*,

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			ROME LEVEL — (*Continued*).
......	.....	9.00	Cowassalon feeder. The dam and bulkhead of this feeder are located 31 chains south of canal
67	35.84	80.72	Lenox basin road bridge
C. 39	.....	86.15	Composite culvert, two openings, two and one-half feet each
......	.....	.....	E. C. and N. railroad bridge, pin-connected.
C. 40	.....	80.23	Composite culvert, one opening
68	38.11	15.09	Petersboro street bridge, Canastota (Whipple arch)
C. 41	.....	12.52	Arch culvert, two spans, each eight-feet chord
69	38.30	2.74	Main street bridge, Canastota (Whipple arch)
C. 42	.....	54.78	Composite culvert, two and one-half feet opening
70	39.86	70.24	Beebee's road bridge (iron chords)
C. 43	.....	25.68	Composite culvert, three openings, three feet each
71	40.35	13.39	Herrick's farm bridge (iron chords)
......	.....	10.57	New York Central and Hudson River railroad bridge (two bridges)
......	.....	.....	New York, West Shore and Buffalo railroad bridge, pin-connected
C. 44	.....	37.78	Composite culvert, three openings
72	40.98	2.07	Fuller's road bridge
73	41.82	67.21	New Boston road bridge (Whipple arch)
C. 45	.....	56.12	Composite culvert, Canasaraga creek, ten openings, three and one-half feet each
74	42.92	32.03	Canasaraga road bridge (Whipple arch)
75	44.47	123.97	Chittenango road bridge (Whipple arch)
......	.....	3.63	Chittenango feeder. The dam and bulkhead of this feeder are located $21\frac{19}{100}$ chains south of the canal
A. 4	44.82	24.50	Chittenango aqueduct, three spans, twenty feet each
C. 46	.....	17.38	Arch culvert, four-feet chord
77	45.67	50.28	Bolivar road bridge (tubular)
C. 47	.....	30.23	Arch culvert, five-feet chords
79	46.66	49.10	White's road bridge
B. H. 6	.....	86.79	Pool's brook waste-weir and bulkhead
80	47.85	8.56	Pool's brook road bridge
81	49.00	91.93	Kirkville road bridge
C. 48	.....	38.69	Arch culvert, three-feet chord

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	Wood	$7\frac{1}{12}$	1	$18\frac{1}{12}$	....	......	....	1886
......	.....	......	....	......	....	......	....	....
......	Iron	......	1	$17\frac{3}{12}$	....	......	....	1887
......	.....	......	...	......	....	......	....	....
Iron ..	.....	$71\frac{9}{12}$	1	19	2	7 $12\frac{1}{12}$	7° 5′ R	1881
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{2}{12}$	1	$18\frac{4}{12}$	2	$6\frac{2}{12}$	....	....
......	.....	......	....	......	....	......	....	....
.....	Wood	$71\frac{5}{12}$	1	$17\frac{3}{12}$	....	......	....	1890
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{6}{12}$	1	$11\frac{11}{12}$	....	......	....	1890
....	Iron	$122\frac{11}{12}$	2	$15\frac{6}{12}$	....	......	....	1874
....	Iron	$122\frac{11}{12}$	1	$15\frac{5}{12}$	..	......	....	1864
			..	$15\frac{8}{12}$	..			
......	Iron	$170\frac{5}{10}$	2	16	....	......	....	1882
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{6}{12}$	1	$12\frac{1}{12}$	....	......	....	1885
Iron ..	.....	$71\frac{5}{12}$	1	17	....	......	....	1873
......	.....	......	....	......	....	......	....	1856
Iron ..	.....	$99\frac{4}{12}$	1	$18\frac{2}{12}$	....	......	48° 25′ R	....
Iron ..	.....	$93\frac{4}{12}$	1	$18\frac{1}{12}$	....	......	39° 30′ L	....
......	.....	......	....	......	....	......	....	....
.....	.....	.....	....	......	....	......	....	1892
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$70\frac{1}{12}$	1	$17\frac{5}{12}$	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{10}{12}$	1	17.0	....	......	....	1887
......	.....	......	....	......	....	......	....	1892
......	Wood	$71\frac{9}{12}$	1	17	....	......	....	1884
......	Wood	$72\frac{1}{12}$	1	$18\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			ROME LEVEL — (*Continued*).
C. 49	49.92	35.02	Arch culvert (Lake brook) six-feet chord...
82	52.00	166.63	Manlius Center road bridge (iron chord)...
......	.....	24.99	Syracuse and Chenango Valley railroad bridge, lattice riveted ....
83	52.44	10.01	Stearn's farm bridge....................
......	.....	27.46	Limestone feeder. The dam and bulkhead of this feeder are located $66\frac{75}{100}$ chains south of the canal.....................
84	.....	1.00	Limestone feeder change-bridge (pipe truss),
A. 5	52.82	2.01	Limestone feeder aqueduct, three spans, twehty feet each ....
85	.....	21.25	Private foot-bridge......................
86	53.38	23.40	Burdick's road bridge....................
C. 50	.....	40.38	Composite culvert, four-feet openings......
A. 6	54.89	80.58	Butternut creek aqueduct, three spans, twenty feet each ....
......	.....	4.00	Orville feeder. The dam and bulkhead are located $177\frac{36}{100}$ chains south of the canal..
87	.....	1.04	Orville feeder change and road bridge .....
88	57.10	171.30	Thompsons' Landing road bridge (Whipple arch) ....
89	57.93	66.65	Private farm bridge at bone yard (wood bents) ....
......	.....	.....	Stop gate east of lock No. 47.............
......	.....	108.11	N. Y. C. & H. R. R. R. tunnel, two arches..
......	59.31	2.50	Head of lock No. 47, stone, double lock ...
			SHORT LEVEL, $\frac{188}{1000}$ MILES.
......	.....	....	Lock No. 47, $10\frac{175}{1000}$ feet lift (eastward) ...
90	.....	8.57	Beech street bridge (Whipple arch)......
......	59.50	6.47	Head of lock No. 48, stone, double lock $10\frac{537}{1000}$ feet lift ....
			LEVEL BETWEEN LOCKS NOS. 48 AND 49, $\frac{714}{1000}$ MILES.
......	.....	.....	Lock No. 48, $10\frac{537}{1000}$ feet lift (eastward)...
91	.....	29.37	William street bridge, Syracuse (Whipple arch) ....
92	.....	22.92	Catharine street bridge, Syracuse (Whipple arch) ....
......	60.21	4.87	Head of lock No. 49, stone, double lock....

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed,
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{1}{12}$	1	$17\frac{11}{12}$	....	......	....	1881
......	Iron .	118	1	$15\frac{1}{12}$	....	......	....	1870
......	Wood	$72\frac{2}{12}$	1	$13\frac{1}{12}$	....	......	....	1890
......	.....	......	....	......	....	......	....	....
......	Iron .	$73\frac{5}{12}$	1	$8\frac{6}{12}$	....	......	....	1879
......	.....	......	....	......	....	......	....	1852
......	Wood	$86\frac{4}{12}$	....	......	1	$6\frac{8}{12}$	....	....
......	Wood	$70\frac{2}{12}$	1	$18\frac{1}{12}$	....	......	....	1887
......	.....	......	....	......	....	......	....	1871
......	.....	......	....	......	....	......	....	1874
......	.....	......	....	......	....	......	....	....
......	Wood	$70\frac{2}{12}$	1	13	....	......	....	1887
Iron ..	.....	$81\frac{7}{12}$	1	$18\frac{3}{12}$	....	......	2° 45′ L	1875
......	Wood	$101\frac{2}{12}$	1	13	....	......	....	1888
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$102\frac{11}{12}$	1	$19\frac{2}{12}$	2	6	3° 30′ L	1888
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
Iron ..	....	$78\frac{7}{12}$	1	$19\frac{4}{12}$	2	7	....	1855
Iron ..	.....	$96\frac{4}{12}$	1	$19\frac{1}{12}$	2	$6\frac{11}{12}$ $6\frac{8}{12}$	....	1885
......	.....	......	....	......	....	.....	....	1887

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			SYRACUSE LEVEL, $5\frac{14}{1000}$ MILES.
......	.....	.....	Lock No. 49, $6\frac{221}{1000}$ feet lift (eastward) ....
93	.....	2.25	Orange street bridge, Syracuse (Whipple arch) ....
94	.....	6.91	Grape street bridge, Syracuse, (Whipple arch) ....
95	.....	7.19	Mulberry street bridge, Syracuse (Whipple arch) ....
95½	.....	.....	Syracuse Heat and Power Company bridge (private) ....
C. 51	60.48	5.39	Weigh-lock and culvert under the canal to empty said weigh-lock ....
96	.....	2.66	East tow-path bridge over the Oswego canal at the junction (tubular)..........
97	.....	3.82	West tow-path bridge over the branch junction (tubular)....................
98	.....	1.73	Warren street bridge, Syracuse (wrought-iron)..............................
99	.....	5.48	Foot-bridge on east side of Salina street, Syracuse (private)....................
100	60.67	0.71	Salina street swing-bridge (wrought-iron) ..
101	.....	5.01	Clinton street bridge, Syracuse (Whipple arch) ....
102	.....	7.94	Franklin street foot-bridge, Syracuse ......
......	.....	0.32	Northern railroad swing-bridge ....
C. 52	.....	9.45	Onondaga creek, arch culvert, two arches, twenty-five feet chord each.............
S. 1	.....	3.23	Spillway at Amos' mills on berme side, 100 feet ....
103	61.02	1.96	West street lift-bridge....................
104	61.64	49.59	Geddes street bridge, Syracuse (Whipple arch) ....
C. 53	.....	14.96	Harbor brook arch culvert, twelve-feet chord ....
......	.....	1.89	New York Central and Hudson River railroad bridge..........................
......	.....	.....	Delaware, Lackawanna and Western railroad bridge..........................
105	62.31	37.39	West Genesee bridge Syracuse (Whipple arch) ....
106	.....	26.53	Bridge street bridge, Syracuse (Whipple arch) ....
107	.....	29.61	Salt Company's bridge (Whipple arch).....
C. 54	.....	4.22	Arch culvert, three-feet chord.............

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$99\frac{2}{12}$	1	$19\frac{1}{12}$	2	$6\frac{5}{12}$	....	1882
Iron ..	.....	$97\frac{1}{12}$	1	18	2	$6\frac{6}{12}$	....	1882
Iron ..	.....	$94\frac{4}{12}$	1	24	2	$8\frac{1}{12}$	....	1890
......	.....	......	...	......	....	......	....	....
......	.....	......	....	......	....	......	....	1866
......	Iron .	$84\frac{11}{12}$	1	$12\frac{3}{12}$	....	......	26° 25′ R	1879
......	Iron .	$66\frac{2}{12}$	1	$12\frac{4}{12}$	....	......	28° 50′ L	1879
Iron ..	. ...	$69\frac{8}{12}$	2	$20\frac{1}{12}$	2	$12\frac{1}{12}$	....	1889
......	.....	......	....	......	....	......	....	1875
......	Iron .	$39\frac{10}{12}$	1	$19\frac{1}{12}$	2	$7\frac{1}{12}$	....	1889
Iron ..	.....	$70\frac{9}{12}$	1	21	2	$7\frac{2}{12}$	....	1864
......	Iron .	$77\frac{11}{12}$	....	......	1	9	0° 40′ L	1889
......	Iron .	$59\frac{2}{12}$	1	$7\frac{5}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
.....	Iron .	$62\frac{11}{12}$	1	$21\frac{10}{12}$	2	$6\frac{2}{12}$	22° 00′ R	1888
Iron ..	.....	$71\frac{9}{12}$	1	$16\frac{10}{12}$	....	......	1° 45′ L	1889
......	.....	......	....	......	....	......	....	....
......	Iron .	$118\frac{4}{12}$	2	15	...	......	....	....
......	Iron .	$118\frac{4}{12}$	1	$15\frac{3}{12}$	....	......	....	1863
Iron ..	.....	$76\frac{4}{12}$	1	18	2	$6\frac{3}{12}$ $6\frac{7}{12}$	24° 30′ R	....
Iron ..	.....	$77\frac{8}{12}$	1	19	1	$5\frac{7}{12}$	....	1886
Iron ..	.....	$88\frac{8}{12}$	1	$8\frac{3}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			SYRACUSE LEVEL — (*Continued*).
108	63.52	35.92	Blast furnace road bridge, Syracuse (Whipple arch)................... ...
108½	.....	.....	Solway Process Co. bridge ....
C. 55	.....	14.94	Arch culvert, three-feet chord.............
109	64.32	53.85	Gere's landing bridge (iron chords)........
C. 56	....	58.88	Double arch culvert, each arch four-feet chord
......	65.23	9.29	To foot of lock No. 50..................
			JORDAN LEVEL, $14\frac{903}{1000}$ MILES.
......	.....	.....	Lock No. 50, double lock, $7\frac{872}{1000}$ feet lift, westward............................
110	.....	14.65	Gere's farm bridge ....
C. 57	.....	31.03	Arch culvert, three-feet chord.......... ...
111	66.25	35.83	Belle Isle road bridge (Whipple arch)......
C. 58	.....	60.43	Arch culvert, three-feet chord............
112	67.14	11.26	Amboy road bridge (Whipple arch) ....
A. 7	68.04	71.30	Nine Mile Creek aqueduct, four spans, thirty one feet each..................
C. 59	.....	56.00	Arch culvert, four-feet chord ....
......	.....	27.36	Camillus feeder. The dam and bulkhead of this feeder is located $132\frac{20}{100}$ chains south of the canal, and just above the village of Camillus ....
113	69.16	6.70	Camillus road and change-bridge..........
R. 1	70.01	68.15	Receiver on berme side..................
114	71.27	100.57	Newport road bridge ....
......	.....	.....	Private bridge at Mellin's cement works....
115	73.85	206.39	Memphis road bridge (iron chord).........
C. 60	.....	63.13	Composite culvert, three openings, three-feet each...............................
116	75.46	65.92	Peru road bridge (iron chord).............
......	.....	70.87	Carpenter brook feeder, dam and guard-gate, twelve chains south of the canal.........
117	76.39	3.63	Shanty Point farm bridge................
C. 61	.....	1.09	Composite culvert, three openings, four feet each...............................
B. H. 7	.....	0.81	Carpenter brook stone waste-weir and bulkhead ....
C. 62	.....	147.48	Composite culvert, four-feet opening.......
119	78.66	32.45	Beaver street bridge, Jordan village.......
A. 8	.....	21.95	Jordan aqueduct, four spans, twenty feet each...............................
C. 63	.....	.....	Arch culvert at west end of aqueduct for mill powers..........................

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
Iron ..	......	$71\frac{9}{12}$	1	$17\frac{2}{12}$	....	......	....	1890
Iron ..	......	......	1	......	....	......	....	1890
......	......	......	....	......	....	......	....	....
......	Wood	71	1	$17\frac{10}{12}$	....	......	....	1889
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	1885
......	Wood	$71\frac{9}{12}$	1	$12\frac{8}{12}$	....	......	....	1883
......	......	......	....	......	....	......	....	....
Iron ..	......	70	1	$17\frac{6}{12}$	....	......	....	1880
......	......	......	....	......	....	......	....	....
Iron ..	......	$70\frac{9}{12}$	1	$17\frac{2}{12}$	....	......	....	1880
......	......	......	....	......	....	......	....	1877
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	Wood	$71\frac{2}{12}$	1	$13\frac{4}{12}$	....	......	....	1882
......	......	......	....	......	....	......	....	....
......	Wood	$71\frac{10}{12}$	1	14	....	......	....	1882
......	Wood	$101\frac{8}{12}$	1	9	....	......	....	....
......	Wood	$71\frac{7}{12}$	1	$19\frac{5}{12}$	2	$6\frac{4}{12}$	....	1882
......	......	......	....	......	....	......	....	....
......	Wood	$71\frac{10}{12}$	1	$15\frac{1}{12}$	....	......	....	1883
......	......	......	....	......	....	......	....	1879
......	Wood	$71\frac{1}{12}$	1	$13\frac{5}{12}$	....	......	....	1882
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	1879
......	......	......	....	......	....	......	....	....
......	Wood	$71\frac{4}{12}$	1	12	....	......	....	1885
.....	......	......	....	......	....	......	....	1891
......	......	......	....	......	....	......	....	1874

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			JORDAN LEVEL — (*Continued*).
......	......	4.55	Skaneateles feeder. The dam and bulkhead of this feeder are located $7\frac{5}{100}$ chains south of the canal, and in the village of Jordan.
120	79.02	2.18	Main street bridge, Jordan (Whipple arch).
121	.....	14.32	Hamilton street bridge, Jordan (iron chords).
C. 64	.....	44.75	Arch culvert, six-feet chord
.....	80.13	29.45	Head of look No. 51, double stone lock
			PORT BYRON LEVEL, $7\frac{793}{1000}$ MILES.
......	......	.....	Lock No. 51 $5\frac{580}{1000}$ feet lift, eastward
C. 65	......	16.33	Composite culvert, four and one-half feet openings
122	80.46	9.52	Cold Spring road bridge
123	81.00	45.44	Fountainville road bridge
C. 66	.....	19.61	Arch culvert, four-feet chord
124	81.32	4.46	Field's road bridge
......	.....	.....	New York, West Shore and Buffalo railroad bridge
C. 67	.....	28.29	Arch culvert, four-feet opening
125	.....	11.50	Private foot bridge (suspension)
C. 68	.....	35.83	Arch culvert, four-feet chord
126	82.76	39.05	Putnam's farm bridge (iron chords)
127	83.18	33.38	Young's farm bridge (iron chords)
......	.....	5.61	Southern Central railroad bridge
C. 69	.....	4.78	Composite culvert, four-feet openings
......	.....	0.85	Putnam brook feeder
B. H. 8	.....	.....	Bulkhead and waste-weir on tow-path side (Putnam brook)
128	83.53	17.25	Seneca street bridge, Weedsport (Whipple arch)
C. 70	.....	19.54	Box culvert (stone) 3x3 feet
130	84.08	24.18	Brutus street bridge (Whipple arch)
......	.....	.....	New York, West Shore and Buffalo railroad bridge
C. 71	.....	31.99	Composite culvert, four-feet openings
A. 9	84.91	34.63	Centerport aqueduct, three spans, twenty feet each, stone abutments and piers
......	.....	64.95	Centerport feeder
133	85.74	1.00	Centerport road bridge (Whipple arch)
R. 2	86.28	43.70	Receiver on berme side
C. 72	.....	35.17	Composite culvert, four-feet opening
C. 73	.....	32.01	Composite culvert, two openings, three feet each

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$81\frac{11}{12}$	1	18	2	$6\frac{5}{12}$	30° 55′ L	....
......	Wood	$71\frac{4}{12}$	1	$18\frac{1}{12}$	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1887
......	.....	......	...	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$73\frac{2}{12}$	1	$17\frac{1}{12}$	....	......	....	1875
......	Wood	$72\frac{5}{12}$	1	$13\frac{1}{12}$	....	......	....	1882
......	....	......	....	......	....	......	....	....
......	Wood	72	1	$17\frac{7}{12}$	....	......	....	1882
......	Iron .	$108\frac{11}{12}$	2	$15\frac{7}{12}$	....	......	....	1883
......	.....	......	....	......	....	......	....	....
......	Iron .	$85\frac{8}{12}$	....	......	1	$3\frac{5}{12}$	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$72\frac{4}{12}$	1	$12\frac{1}{12}$	....	......	....	1877
......	Wood	$71\frac{4}{12}$	1	$13\frac{10}{12}$	....	......	....	1877
......	Iron .	$106\frac{10}{12}$	1	$15\frac{6}{12}$	....	......	....	1878
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1879
Iron ..	.....	$71\frac{11}{12}$	1	$19\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1860
Iron ..	.....	$75\frac{11}{12}$	1	$18\frac{9}{12}$	2	$6\frac{5}{12}$ $6\frac{9}{12}$	17° 50′ L	....
......	Iron .	$193\frac{5}{12}$	2	16	....	......	....	1883
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	.....	....	1891
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{8}{12}$	1	$18\frac{11}{12}$	2	6	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the location of*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			PORT BYRON LEVEL—(*Continued*).
134	87.17	4.02	Utica street bridge, Port Byron (Whipple arch) ....
135	......	9.46	Main street bridge, Port Byron (Whipple arch)
C. 74	......	3.01	Arch culvert, four-feet chord ....
A. 10	87.51	14.84	Port Byron aqueduct, four spans, twenty-one each, stone abutment and piers..........
......	......	2.97	Port Byron feeder. The dam and bulkhead are located 168 chains south of the canal and south of the village of Port Byron. The water is conducted from the end of the open channel and the well-house, to the canal through an iron pipe forty-two inches in diameter and 859 feet long.....
136	......	5.74	Owasco street bridge, Port Byron (Whipple arch) ....
137	......	7.94	Canal street bridge, Port Byron (Whipple arch) ....
C. 75	......	15.38	Arch culvert, six-feet chord ....
......	87.93	.98	Head of lock No. 52, stone, double lock....
			MONTEZUMA LEVEL TO WAYNE COUNTY LINE $9\frac{98}{1000}$ MILES.
......	......	......	Lock No. 52, $11\frac{417}{1000}$ lift, eastward ....
138	88.72	63.63	Houghtaling road bridge (Whipple arch) ..
C. 76	......	148.30	Composite culvert 3x4 feet openings.......
139	90.64	5.61	McLeod's road bridge (Whipple arch)......
A. 11	......	9.77	Cranebrook aqueduct, three spans, twenty feet each, stone abutments and piers...
140	......	9.02	Bucklin's farm bridge....................
C. 77	......	75.79	Arch culvert, four-feet chord..............
S. 2	......	1.38	Spillway at Montezuma, eighty two-feet long
141	91.87	1.99	Salt street road bridge, Montezuma (Whipple arch) ....
142	......	4.12	High street foot-bridge, tubular...........
......	......	.26	Cayuga and Seneca canal junction.........
143	91.95	2.40	Change-bridge at junction.................
C. 78	......	22.08	Arch culvert, four-feet chord ....
144	......	2.01	Clark street bridge, Montezuma...........
A. 12	92.70	35.79	Seneca river aqueduct, thirty-one spans, twenty-two feet each, stone abutments and piers.........................
145	95.01	184.53	May's point road and change-bridge ....
C. 79	......	20.79	Composite culvert, two openings, three feet each ....

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
Iron ..	.....	$98\frac{5}{12}$	1	19	....	.....	51° 05′ R	1877
Iron ..	.....	$71\frac{6}{12}$	1	$19\frac{1}{12}$	2	$6\frac{5}{12}$	7° 15′ R	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$74\frac{8}{12}$	1	$18\frac{9}{12}$	2	$6\frac{9}{12}$	16° 45′ L	1886
Iron ..	.....	$71\frac{4}{12}$	1	19	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{2}{12}$	1	$19\frac{1}{12}$	....	......	....	1888
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{1}{12}$	1	$19\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	Plank 1889
......	Wood	$70\frac{10}{12}$	1	$12\frac{9}{12}$	....	......	....	1883
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{11}{12}$	1	$18\frac{10}{12}$	....	......	....	1865
Iron ..	.....	$79\frac{4}{12}$	....	......	1	$8\frac{7}{12}$	....	1882
......	.....	......	....	......	....	......	....	....
......	Wood	72	1	12	....	......	....	1872
......	.....	......	....	......	....	......	....	....
......	Wood	$72\frac{1}{12}$	1	$16\frac{5}{12}$	....	......	....	1892
......	.....	......	....	......	....	......	....	1882 to 1892
......	Wood	$71\frac{7}{12}$	1	$17\frac{11}{12}$	....	......	....	1885
......	.....	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the location of*

Number of structure.	Distance from Erie canal in miles—approximate.	Distances in chains and links.	GENERAL DESCRIPTION.
			MONTEZUMA LEVEL TO WAYNE COUNTY LINE—(*Continued*).
C. 80	......	80.97	Composite culvert, two openings, three feet each..............................
......	97.02	59.40	End of middle division at Wayne county line
			ORISKANY FEEDER.
1	.....	4.20	Christman's road bridge..................
2	.....	9.50	Christman's farm bridge ....
D. 1	0.53	32.90	Dam in Oriskany creek ....
B. H. 1	0.53	.....	Bulkhead at dam.........................
			Summit Level, Chenango Canal.
A. 1	20.30	.....	Aqueduct at Sollsville. ....
D. 2	20.30	.....	Dam in old Chenango canal (earth)........
3	20.91	48.50	Road bridge over old Chenango canal......
4	22.29	110.80	Cherry Valley road bridge ....
5	23.10	65.00	Farm bridge over old Chenango canal......
6	23.90	63.78	Road bridge over old Chenango canal......
......	23.93	3.00	Outlet Leland's ponds....................
7	25.13	96.16	Road bridge over old Chenango canal......
8	.....	.....	Tow-path bridge over Madison brook feeder
......	25.55	33.55	Outlet Madison brook feeder..............
......	25.60	3.95	Outlet West Branch feeder (Kingsley brook, Bradley brook, Hatch's lake and Eaton reservoir)...........................
D. 3	25.61	.....	Dam in Chenango canal (Lock No. 77).....
			Leland's Ponds Feeder and Reservoir.
......	.....	.....	Well-house Leland's ponds ....
D. 4	24.24	.....	Dam Leland's ponds.....................
			Madison Brook Feeder.
C. 1	.....	.....	Culvert over Woodman's pond outlet......
B. H. 2	.....	.....	Bulkhead Madison brook..................
9	.....	.....	Road bridge............................
D. 5	28.54	.....	Madison brook dam and gate-house........
Sp. 1	.....	.....	Madison brook spil'way and three over-falls (stone)...........................
			West Branch Feeder.
B. H. 3	25.64	3.00	Bulkhead...............................
10	.....	25.10	Albe's road bridge......................
11	.....	8.50	Weaver's farm bridge....................
12	.....	7.50	Weaver's road bridge ....

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$19\frac{5}{12}$	1	21	....	......	....	1885
......	Wood	$19\frac{5}{12}$	1	13	....	......	....	....
......	....	......	....	......	....	......	....	1888
......	....	......	....	......	....	......	....	1884
......	....	......	....	......	....	......	....	1884
......	....	......	....	......	....	......	....	1887
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	1886
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the location of*

Number of structure.	Distance from Erie canal in miles—approximate.	Distances in chains and links.	GENERAL DESCRIPTION.
			West Branch Feeder—(Continued).
13	26.22	5.38	S. B. Burchard's farm bridge
14	26.77	44.30	T. Burchard's farm bridge
15	.....	19.40	Woodman's farm bridge
16	27.95	75.00	Osgood's farm bridge
17	.....	22.60	Pierce's farm bridge
C. 2	.....	8.50	Beach's culvert
18	.....	4.00	Beach's farm bridge
19	28.61	17.80	Wickwire's road bridge
20	.....	11.96	Wickwire's farm bridge
21	.....	12.21	Wm. Russell's farm bridge
C. 3	.....	24.85	Joslin's culvert
22	29.71	38.68	Russell's road bridge
23	.....	30.43	Shapley's road bridge
24	30.44	28.07	Ladd's road bridge
25	.....	37.70	Chase's farm bridge
26	.....	10.77	S. Sherrill's lower farm bridge
27	.....	13.23	S. Sherrill's upper farm bridge
B. H. 4	31.41	15.80	Bulkhead
D. 6	.....	.....	Dam, west branch, Chenango river
			Chenango River and Eaton Brook.
D. 7	38.50	.....	Eaton reservoir dam and discharge gates. (There are a set of low gates discharging through pipes, and a set of high gates with stone sluices below them)
			Bradley Brook Feeder.
B.H. 5	31.43	1.50	Bulkhead
W. 1	.....	1.00	Waste-weir
28	.....	23.52	Hatch's farm bridge
29	.....	14.81	D. Shapley's lower farm bridge
B.H. 6	32.08	12.47	Bulkhead
D. 8	.....	0.20	Dam in Bradley's brook
D. 9	35.90	.....	Bradley brook reservoir dam
Sp. 2	.....	.....	Spillway
B.H. 7	.....	.....	Bulkhead, Hatch's lake outlet
D. 10	36.13	.....	Dam, Hatch's lake
......	.....	.....	Well-house, Hatch's lake
			Kingsley Brook Feeder.
B.H. 8	32.09	0.50	Bulkhead
30	.....	3.45	A. Sherrill's farm bridge
31	.....	12.60	Sherrill's road bridge
32	.....	16.32	D. Shapley's upper farm bridge

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	...
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	1882
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	1879
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	1882
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the location of*

Number of structure.	Distance from Erie canal in miles—approximate.	Distances in chains and links.	GENERAL DESCRIPTION.
			Kingsley Brook Feeder—(Continued).
33	33.00	40.37	Wheeler's lower farm bridge
34	.....	15.01	Wheeler's upper farm bridge
C. 4	.....	28.25	Allen's culvert
35	.....	1.60	Allen's farm bridge
36	....	15.15	Kingsley's farm bridge
B. H. 9	.....	16.10	Bulkhead
D. 11	33.95	0.20	Dam in Kingsley brook
D. 12	.....	.....	Kingsley brook reservoir dam and discharge pipes. (The dam is used as a road)
37	.....	.....	Road bridge
B.H.10	.....	.....	Bulkhead
			MOHAWK FEEDER (ROME).
B. H. 1	0.03	2.77	Bulkhead
			Mohawk River.
D. 1	.....	7.50	Stone dam in Mohawk river
......	8.00	.....	Mohawk river to Delta dam
......	18.00	.....	Mohawk river to Lansing kill
			Lansing Kill.
......	21.50	.....	Lansing kill to dam, near lock 33, Black River canal
......	26.00	.....	Lansing kill above dam
			Feeder.
......	27.80	.....	Feeder between locks Nos. 63 and 70, Black River canal
			ONEIDA CREEK FEEDER.
1	0.07	5.40	Bridge
C. 1	.....	5.05	Culvert
2	1.19	84.65	Sherman street bridge
3	.....	26.40	Elm street bridge
......	.....	8.38	New York Central Railroad bridge
4	.....	3.12	Madison street bridge
5	.....	3.20	Phelps street bridge
6	.....	13.00	Cherry street bridge
7	2.23	29.00	Walnut street bridge
C. 2	.....	21.40	Culvert
B. H. 1	.....	32.70	Bulkhead
D. 1	2.91	0.10	Dam in Oneida creek

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	....	.....	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
.....	....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1865
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	.....	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
.....	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
.....	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1886
......	.....	......	...	......	....	......	....	1886
......	.....	......	....	......	....	......	....	....
.....	.....	......	....	......	....	......	....	1878
......	.....	......	....	......	....	......	....	1878

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Distance from Erie canal in miles — approximate.	Distances in chains and links.	GENERAL DESCRIPTION.
			COWASSALON FEEDER.
......	0.07	5.30	Guard-gate
B. H. 1	.....	21.59	Bulkhead and spillway
D. 1	0.40	5.11	Dam in Cowassalon creek
			CHITTENANGO FEEDER.
1	0.03	2.30	Erie street bridge
C. 1	.....	4.23	Guard-gates
	.....	1.91	Culvert
B. H. 1	.....	13.75	Bulkhead
D. 1	0.28	.....	Dam in Chittenango creek
			Chittenango Creek.
D. 2	11.00	.....	Dam at Cazenovia
2	.....	1.50	Mill street bridge
......	.....	10.58	Erieville junction
			Cazenovia Lake Outlet.
B. H. 2	.....	2.57	Bulkhead
3	.....	14.70	Forman street bridge (Whipple)
......	11.15	11.35	Cazenovia lake
			Chittenango Creek.
D. 3	22.00	.....	Erieville reservoir, dam, well-house and discharge pipes
			LIMESTONE FEEDER.
C. 1	0.33	26.75	Culvert
W. 1	.....	18.00	Waste-weir on tow-path
B. H. 1	0.83	22.00	Bulkhead
D. 1	.....	.....	Dam in Limestone creek
			Limestone Creek.
D. 2	17.50	.....	DeRuyter reservoir, dam, well-house and discharge pipes
			DeRuyter Reservoir.
......	19.30	.....	Head of reservoir
			Tioughnioga Feeder.
......	.....	.....	Two road bridges, three farm bridges and five stone overfalls in feeder from Tioughnioga river
D. 3	20.30	.....	Dam in Tioughnioga river

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	1858
......	. ...	......	....	......	....	......	....	1859
......	.....	......	....	......	....	....	....	1858
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	..	....	1858
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	... .	....
......	.....	......	....	......	....	......	....	1878
......	.....	......	....	......	....	......	....	1879
......	.....	......	....	......	....	......	....	1865
......	.....	......	....	.....	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$27\frac{6}{12}$	1	$19\frac{2}{12}$	2	$7\frac{1}{12}$	2° L	1881
......	.....	......	....	......	...	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1879
......	.....	......	....	......	....	......	....	1879
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	1891
......	.....	.....	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	.....	....	....

TABLE No. 4 — (Continued) — *Showing the location of*

Number of structure.	Distance from Erie canal in miles — approximate.	Distances in chains and links.	GENERAL DESCRIPTION.
			ORVILLE FEEDER.
1	0.08	6.60	Road bridge..... ....
2	0.94	68.30	Orville road bridge (Whipple) ....
W. 1	.....	12.30	Waste-weir. ....
3	1.67	46.50	Dunlaps road bridge....................
4	2.00	26.06	Steel's farm bridge......................
......	.....	.....	Two overfalls (stone)....................
B. H. 1	2.22	17.60	Bulkhead ....
D. 1	2.22	.....	Dam in Butternut creek.................
			Butternut Creek.
D. 2	3.92	.....	Jamesville reservoir dam, well-house and discharge pipes........................
			CAMILLUS FEEDER.
1	0.96	76 60	Street bridge...........................
W. 1	.....	.....	Waste-weir............................
......	.....	6.60	Guard-gate............................
B. H. 1	1.69	52.00	Bulkhead ....
D. 1	1.69	.....	Dam in Nine Mile Creek................
			Nine Mile Creek.
B. H. 2	11.70	.....	Bulkhead ....
D. 2	11.70	.....	Dam at foot of Otisco lake...............
			Otisco Lake Reservoir.
2	17.00	.....	Road bridge near head of lake............
			CARPENTER BROOK FEEDER.
......	.....	12.35	Guard-gates ....
D. 1	.....	.....	Dam in Carpenter's brook.. ....
D. 2	0.18	2.00	Dam (for reservoir)......................
			JORDAN FEEDER.
1	.....	.....	Street bridge...........................
B. H. 1	.....	3.28	Bulkhead ....
B. H. 2	.....	3.52	Bulkhead ....
D. 1	0.09	0.25	Dam in Skaneateles creek................
			Skaneateles Creek.
D. 2	9.50	.....	Dam at Skaneateles......................
B. H. 3	.....	.....	Bulkhead ....
2	9.57	5.50	Bridge over outlet......................

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Wood	$41\frac{7}{12}$	1	$17\frac{4}{12}$	....	......	....	....
Iron ..	.....	......	....	......	....	......	....	1879
......	.....	......	....	......	....	......	....	1858
......	.....	......	....	......	....	......	....	1879
......	.....	......	....	......	....	......	....	1886
......	.....	......	....	......	....	.....	....	1886
......	.....	......	....	......	.. ..	......	....	1886
......	.....	......	...	.....	....	......	....	1886
......	.....	......	....	......	....	......	....	1874
......	Wood	$33\frac{1}{12}$	1	$18\frac{9}{12}$	2	$5\frac{10}{12}$	....	1892
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	1840
......	.....	......	....	......	....	......	....	1841
......	.....	......	....	......	....	......	....	1840
......	.....	......	....	......	....	.....	....	....
......	.....	......	....	......	....	......	....	1871
......	.....	......	....	......	...	......	....	1872
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1881
......	.....	......	....	......	....	......	....	1841
......	......	......	....	......	....	......	....	....
......	......	......	....	......	..	......	....	....
......	......	......	....	......	....	......	....	...
......	......	......	....	......	....	......	....	1878
......	......	.....	....	......	....	......	....	1868
......	......	.....	....	......	....	.....	....	1885
......	......	.....	....	......	....	......	....	1887

TABLE No. 4—(Continued)—*Showing the location of*

Number of structure.	Distance from Erie canal in miles—approximate.	Distances in chains and links.	GENERAL DESCRIPTION.
			CENTERPORT FEEDER.
D. 1	0.18	14.00	Dam ....
			PORT BYRON FEEDER.
R. 1	.....	.....	Receiver at canal........................
......	.....	.....	Wrought-iron pipe.......................
......	0.16	.....	Gate-house and well.....................
W. 1	0.52	.....	Waste-weir.......................... ...
1	1.85	.....	Road bridge...........................
B. H. 1	2.10	.....	Bulkhead ....
D. 1	2.10	.....	Dam in Owasco creek....................
			Owasco Creek.
B. H. 1	.....	.....	Bulkhead ....
D. 2	10.00	. ...	Dam at Auburn..........................
2	11.25	.....	Road bridge over outlet.......... ....
......	13.00	. ...	Owasco lake...........................

the structures on the Erie canal, feeders and reservoirs.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	......	......	....	......	....	......	....	....
......	......	......	....	......	...	......	....	1876
......	......	......	....	......	....	......	....	1876
......	......	......	....	......	....	......	....	1876
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	....	....	.....	....	......	....	1879
......	......	......	....	......	....	......	....	1873
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	1875
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the length of levels*

(Commencing at the junction of the

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 1, $135\frac{51}{100}$ CHAINS.
$0\frac{1}{2}$	.....	3.65	Change-bridge connected with James street bridge
1	.....	.....	James street bridge, Syracuse (Whipple arch)
2	.....	5.30	Willow street bridge, Syracuse (Whipple arch)
......	.....	.....	N.Y., W.S.&B. railroad lift-bridge, Syracuse,
$2\frac{1}{2}$	.....	.....	Salina street foot-bridge, Syracuse (girder),
3	.26	11.70	Salina street lift-bridge, Syracuse
......	.....	.....	Syracuse and Chenango Valley railroad swing-bridge (plate girder)
4	.....	32.30	Division street bridge, Syracuse (Whipple arch)
5	1.31	51.55	Bear street bridge, Syracuse (Whipple arch)
$5\frac{1}{2}$	.....	.. ..	Stringer bridge over Haskin's race
S. 1	.....	.....	Spillway at Haskin's mill, sixty-five feet long,
6	.....	29.01	Salina street bridge, Syracuse (Whipple arch),
......	1.69	2.00	Head of lock No. 1, eleven-feet lift, southward
			LEVEL No. 2, $9\frac{85}{100}$ CHAINS.
......	.....	......	Covered sluice around locks Nos. 1 and 2, 430 feet long
7	.....	5.30	Park street bridge, Syracuse (Whipple arch)
......	1.82	4.55	Head of lock No. 2, eleven-feet lift, southward
			LEVEL No. 3, $9\frac{90}{100}$ CHAINS.
S. 2	.....	.....	Spillway on berme side
......	1.94	9.90	Head of lock No. 3, stone, ten and one-half feet lift, southward
			LEVEL No. 4, $435\frac{28}{100}$ CHAINS.
8	.....	12.70	Change-bridge
......	.....	.....	Side-cut to salt works
C. 1	.....	.....	Composite culvert
......	.....	.....	N. Y. C. and Hudson R. R. R. bridge; freight track
S. 3	.....	.....	Spillway, stone
$8\frac{1}{2}$	.....	.....	Salt works bridge (Main) Greenpoint
9	2.51	32.54	Greenpoint road and change-bridge (iron chords)
......	.....	.....	Syracuse and Northern railroad bridge (R. W. & O. R. R.) pin connected
C. 2	4.35	147.76	Stone culvert at Liverpool
S. 4	.....	.....	Spillway
10	4.91	44.80	Liverpool road bridge

on the Oswego canal and the structures on each in their order.

Erie and Oswego canals at Syracuse.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Iron .	$73\frac{4}{12}$	1	$11\frac{7}{12}$	....	......	....	....
Iron ..	.....	$73\frac{6}{12}$	2	$22\frac{1}{12}$	2	14	....	1886
Iron ..	.....	$73\frac{9}{12}$	2	$19\frac{10}{12}$	2	$11\frac{6}{12}$	....	....
......	Iron .	$65\frac{7}{12}$	1	29	....	......	....	1883
......	Iron .	$97\frac{8}{12}$	....	......	1	$7\frac{1}{12}$	....	1883
......	Iron .	$79\frac{4}{12}$	1	$25\frac{6}{12}$	2	$6\frac{4}{12}$	....	1883
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{7}{12}$	1	19	2	$6\frac{2}{12}$	....	1871
Iron ..	.....	$80\frac{1}{12}$	1	$18\frac{1}{12}$	1	$6\frac{7}{12}$	....	1871
Wood	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{5}{12}$	1	$18\frac{10}{12}$	2	$6\frac{2}{12}$	....	1891
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$72\frac{1}{12}$	1	$18\frac{11}{12}$	2	$6\frac{2}{12}$	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$78\frac{7}{12}$	1	$14\frac{6}{12}$	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1885
......	Iron .	$128\frac{8}{12}$	2	$15\frac{6}{12}$	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	Wood	$72\frac{1}{12}$	1	$10\frac{10}{12}$	....	......	....	....
......	Wood	$72\frac{7}{12}$	$3\begin{cases}2\\1\end{cases}$	$\left.\begin{matrix}12\frac{8}{12}\\11\end{matrix}\right\}$	....	......	....	....
......	Iron .	$139\frac{7}{19}$	1	$15\frac{6}{12}$	....	......	....	....
......	.....	......	...	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$73\frac{1}{12}$	1	13	....	......	....	1887

TABLE No. 4—(Continued)—*Showing the length of levels*

(Commencing at the junction of the

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 4—(*Continued*).
C. 3	5.97	84.90	Culvert..................................
11	6.92	76.00	Change-bridge (Whipple pipe) Mud Lock..
11¼	.....	.....	Approach east side of bridge No. 11, over State ditch..........................
11½	.....	.....	Outlet bridge (Whipple arch).............
B. H. 1	.....	.....	Bulkhead, just above lock No. 5, sixteen feet long..................................
......	7.38	36.58	Head of lock No. 5, $9\frac{68}{100}$ feet lift, southward,
			LEVEL No. 5, $769\frac{60}{100}$ CHAINS. (River.)
......	.....	.....	One sluice, wood, through tow-path........
12	7.89	40.83	Cold Spring bridge (Whipple arch)........
......	.....	.....	Eleven sluices, wood, through tow-path.....
13	12.72	386.00	Belgium road bridge (Whipple arch) .....
......	.....	.....	Seven sluices, wood, through tow-path .....
14	14.73	160.85	Three River Point tow path and road bridge, six spans, whole length of bridge, $312\frac{5}{12}$ feet, four pier cribs, $10\frac{10\frac{1}{2}}{12}$ each and one pile pier ten feet.
......	.....	.....	Five sluices, wood, through tow-path ......
......	.....	.....	One sluice, stone, through tow-path........
......	.....	.....	Two sluices, wood, through tow-path ......
15	16.98	180.12	Lock street bridge, iron chords, connected with river bridge at Phœnix.
......	17.00	1.80	Head of guard-lock No. 1, at Phœnix......
			LEVEL No. 6, $270\frac{12}{100}$ CHAINS.
......	.....	6.60	Phœnix dam, stone spillway, 440 feet long,
16	.....	0.80	Bridge street bridge, Phœnix (iron chords)
17	17.17	6.00	Phœnix change and road bridge...........
C. 4	17.68	40.70	Brandy brook culvert....................
18	20.23	203.87	Change-bridge at Hinmansville............
19	.....	6.00	Hinmansville road bridge (iron chords).....
......	20.38	6.22	Head of lock No. 6, seven-feet lift, southward,
			LEVEL No. 7, $187\frac{30}{100}$ CHAINS.
......	.....	.....	Seven sluices, wood abutments, tow-path side..................................
......	21.17	63.30	Guard-lock No. 2, on berme side (not used)

on the Oswego canal and the structures on each in their order.

Erie and Oswego canals at Syracuse.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{2}{12}$	1	$13\frac{9}{12}$	....	......	....	....
......	Wood	$40\frac{4}{12}$	1	$14\frac{4}{12}$	....	......	....	....
Iron ..	.....	$82\frac{8}{12}$	1	15	....	......	....	....
......	.....	......	....	......	....	... ..	....	1883
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	.....	....	....
Iron ..	.....	$163\frac{5}{12}$	1	$18\frac{11}{12}$	....	......	....	1871
......	.....	......	...	......	....	......	....	....
Iron ..	.....	$107\frac{8}{12}$	1	$17\frac{10}{12}$	....	......	....	1873
......	.....	......	....	......	....	......	....	....
......	Wood	$24\frac{8}{12}$ $49\frac{1}{12}$ $45\frac{6}{12}$ $48\frac{2}{12}$ 48 $43\frac{6}{12}$	1	$15\frac{1}{12}$	....	......	....	1884
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$69\frac{10}{12}$ $64\frac{10}{12}$	1	$20\frac{6}{12}$	....	......	....	1881
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	1885
......	Wood	......	1	18	....	......	....	1887
......	Wood	$72\frac{3}{12}$	2	$13\frac{10}{12}$ $10\frac{10}{12}$		......	....	1885
......	.....	......	....	......	....	......	.... ..	....
......	Wood	$73\frac{11}{12}$	1	$13\frac{9}{12}$	....	......	....	1891
......	Wood	$72\frac{11}{12}$	1	$19\frac{1}{12}$	....	......	.... ..	1879
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length of levels*

(Commencing at the junction of the

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 7 — (*Continued*).
S. 5	22.41	99.20	Spillway on berme side..................
......	22.72	24.80	Head of lock No. 7, $5\frac{866}{1000}$ feet lift, southward ....
			LEVEL No. 8, $281\frac{91}{100}$ CHAINS.
......	.....	.....	Eleven sluices, wood abutments, through tow-path ....
......	26.24	281.91	Head of guard lock No. 3, stone...........
			LEVEL No. 9, $37\frac{65}{100}$ CHAINS.
.20	.....	17.05	South Fulton road bridge ....
......	....	.....	Oswego Falls dam, stone spillway, 413 feet long ....
......	.....	.....	Wicks & Redhead pulp-mill bridge (private).
S. 6	.....	9.10	Spillway on berme side..................
......	.....	.....	Foundry power bridge (private)...........
21	.... .	3.50	Broadway bridge, Fulton road (Whipple arch)
......	26.71	8.00	Head of lock No. 8, $11\frac{25}{100}$ feet lift, southward.
			LEVEL No. 10, $46\frac{04}{100}$ CHAINS.
......	29.07	28.34	Side-cut lock, Fulton Mills................
......	.....	.....	Box factory bridge (private)...............
......	.....	.....	Box factory bridge over hydraulic lock (private) ....
......	.....	.....	Fulton dam, stone spillway, 503 feet long..
22	.....	7.84	First street bridge, Fulton (Whipple arch)..
23	.....	1.50	Oneida street bridge, Fulton (Whipple arch)
......	.....	.....	State shop.............................
......	27.29	8.36	Head of lock No. 9, $7\frac{25}{100}$ feet lift, southward
			LEVEL No. 11, $11\frac{54}{100}$ CHAINS.
S. 7	.....	10.54	Spillway at head of Lock No. 10 ....
.....	27.43	1.00	Head of lock No. 10, nine-feet lift, southward
			LEVEL No. 12, $96\frac{66}{100}$ CHAINS.
......	.....	.....	Foot-bridge (private) on bents ....
A. 1	.....	28.00	Aqueduct (one span)....................
25	27.81	2.24	Plankroad and change-bridge (Whipple arch) ....
26	.....	58.59	Orchard change-bridge (iron chords).......
......	28.64	7.83	Head of lock No. 11, $11\frac{666}{1000}$ feet lift southward

on the Oswego canal and the structures on each in their order.

Erie and Oswego canals at Syracuse.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1889
......	Wood	$72\frac{11}{12}$	1	14	....	......	....	1886
......	.....	......	....	......	....	......	....	....
......	Iron .	$109\frac{7}{12}$	1	8	....	......	....	....
......	.....	......	....	......	....	......	....	1891
......	Wood	$81\frac{10}{12}$	1	9	....	......	....	....
Iron ..	.....	$76\frac{8}{12}$	1	$19\frac{2}{12}$	2	$6\frac{6}{12}$	....	1891
......	.. ..	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$117\frac{9}{12}$	1	$16\frac{2}{12}$	....	......	....	1888
Iron ..	.....	$39\frac{2}{12}$	1	17	....	......	....	....
......	.....	......	....	......	....	......	....	1892
Iron ..	.....	$81\frac{2}{12}$	1	$18\frac{9}{12}$	2	6	....	1870
Iron ..	.....	$76\frac{4}{12}$	1	19	2	6	....	1889
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	1892
......	.....	......	....	......	....	......	....	1890
......	Wood	$88\frac{10}{12}$	....	......	1	$6\frac{10}{12}$	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	77	1 1	18 $10\frac{10}{12}$		Road change.	....	....
......	Wood	$77\frac{3}{12}$	1	$12\frac{1}{2}$	....	......	....	1888
......	.....	......	....	......	....	......	....	1889

TABLE No. 4 — (Continued) — *Showing the length of levels*

(Commencing at the junction of the

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 13, $142\frac{14}{100}$ CHAINS.
......	.....	.....	Eight sluices, wood abutments, through tow-path ....
26½	.....	.....	Bridge over Black creek, tow-path, wooden abutments (stringer) ....
......	.....	.....	One sluice, wood abutments, through tow-path ....
......	30.42	142.14	Head of guard-lock No. 4 (Battle island) ...
			LEVEL NO. 14, $182\frac{3}{100}$ CHAINS.
......	.....	3.00	Van Buren dam, stone, spillway 662 feet long,
27	.....	10.29	Change-bridge (Battle island) ....
28	32.13	123.43	Change-bridge (Bundyville) ....
......	.....	......	Three sluices, wood abutments, through tow-path ....
......	32.70	45.31	Head of lock No. 12, $11\frac{25}{100}$ feet lift, southward,
			LEVEL NO. 15, 61 CHAINS.
......	33.32	50.20	Minetto dam, stone spillway, 445 feet long ..
29	.....	2.30	Minetto road bridge (Whipple arch) ....
......	33.46	8.50	Head of lock No. 13, $5\frac{65}{100}$ feet lift, southward,
			LEVEL NO. 16, $92\frac{3}{100}$ CHAINS.
......	.....	.....	Two sluices, wood abutments, through tow-path ....
S. 7½	.....	.....	Spillway on berme ....
......	.....	.....	One sluice, stone abutment, tow-path side ..
......	34.61	92.03	Head of lock No. 14, $9\frac{25}{100}$ feet lift, southward,
			LEVEL NO. 17, $84\frac{68}{100}$ CHAINS.
......	.....	.....	High dam, stone, spillway 363 feet long ...
......	35.67	84.68	Head of lock No. 15, $5\frac{75}{100}$ feet lift, southward,
			LEVEL NO. 18, $30\frac{17}{100}$ CHAINS.
S. 8	.....	30.17	Spillway on berme side ....
......	36.04		Head of lock No. 16, $8\frac{666}{1000}$ feet lift, southward,
			LEVEL NO. 19, $81\frac{26}{100}$ CHAINS.
......	.....	.....	Sluice No. 62, stone abutment, through tow-path ....
......	37.00	76.61	Oswego dam, stone spillway, 530 feet long ..
......	37.06	4.65	Head of guard-lock No. 5 ....
......	.....	.....	River wall from Oswego dam to guard-lock No. 5 ....

on the Oswego canal and the structures on each in their order.

Erie and Oswego canals at Syracuse.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	20	1	$12\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	1891
......	Wood	$74\frac{8}{12}$	1	$12\frac{6}{12}$	...	......	....	1891
......	Wood	$74\frac{10}{12}$	1	$14\frac{3}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1884
Iron ..	.....	$83\frac{6}{12}$	1	18	....	......	....	1872
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1892
......	.....	......	....	......	....	.....	....	....
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length of levels*

(Commencing at the junction of the

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 20, $23\frac{98}{100}$ CHAINS.
......	.....	9.56	Weigh-lock (abandoned) ....
30	3.85	.....	Hubbard street bridge (iron chords)........
C. 4½	.....	.....	Culvert from race to mills................
......	37.36	10.57	Head of lock No. 17, $10\frac{60}{100}$ feet lift, southward,
			LEVEL NO. 21, $21\frac{10}{100}$ CHAINS.
......	.....	.....	River wall from lock No. 17 to lock No. 18..
C. 5	.....	.....	Culvert ....
31	.....	11.10	Utica street bridge, Oswego (deck truss)...
......	.....	.....	Railroad bridge (Midland), Oswego........
S. 9	.....	.....	Spillway on berme......................
......	37.62	10.00	Head of lock No. 18, $9\frac{25}{100}$ feet lift, southward, at high water and $13\frac{33}{100}$ feet lift, southward, at low-water mark...........
			LEVEL OF OSWEGO HARBOR AND LAKE ONTARIO
......	.....	.....	River wall, on berme side, extends from lock No. 18, $11\frac{80}{100}$ chains to the north line of Bridge street and fifty chains from Bridge street to mouth of harbor...............
......	.....	.....	State shop is located on the berme side of lock No. 18..........................
......	37.78	12.36	Bridge street bridge....................
	From lock No. 3		SALINA SIDE CUT LEVEL (NORTH) $68\frac{78}{100}$ CHAINS
......	.....	2.50	Head of lock No. 4.....................
1	.....	11.90	Spring street bridge (on bents)............
2	0.46	22.05	Third North street bridge (on bents). .....
3	.....	18.50	Sixth North street bridge (on bents).......
S. 1	.....	.....	Spillway and waste weir..................
......	10.86	13.83	End of side-cut..........................
	From main line		SALINA SIDE-CUT LEVEL (SOUTH) $93\frac{4}{100}$ CHAINS (INCLUDING SLIPS.)
1	0.36	28.78	Park street (or Liverpool road bridge) .....
2	.....	7.10	Salina street (Whipple arch, cast-iron) .....
3	.....	5.26	Bridge over side-cut to salt blocks (wood abutments) ....
4	0.60	7.10	Marsh street (stringer)..................
			SLIPS AT LIVERPOOL 20 CHAINS LONG (AGGREGATE.)
......	.....	.....	Swing bridge over south slip..............

on the Oswego canal and the structures on each in their order.

Erie and Oswego canals at Syracuse.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	1866
......	Wood	$79\frac{5}{12}$	1	$19\frac{1}{12}$	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Iron.	102	1	$20\frac{10}{12}$	2	$7\frac{6}{12}$		1869
......	.....	......	....	......	....	......	....	....
......	Iron.	$172\frac{4}{12}$	1	19	....	......	....	1876
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$59\frac{6}{12}$	1	$15\frac{1}{12}$	....	......	....	1888
......	Wood	$58\frac{9}{12}$	1	$11\frac{11}{12}$	....	......	....	1887
......	Wood	$57\frac{6}{12}$	1	$12\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	Iron.	$30\frac{8}{12}$	1	$19\frac{1}{12}$	....	......	....	1881
Iron..	.....	$48\frac{4}{12}$	1	$19\frac{1}{12}$	....	......	....	1887
......	Wood	$38\frac{7}{12}$	1	$10\frac{10}{12}$	....	......	....	....
......	.....	$17\frac{10}{12}$	1	$20\frac{20}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1886

TABLE No. 4—(Continued)—*Showing the length of levels*

(Commencing at the junction of the

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
	From Cold-spring bridge.		SENECA RIVER TOWING-PATH, $466\frac{21}{100}$ CHAINS.
......	5.06	404.76	Float-bridge, 436 feet long ....
......	5.83	61.45	Foot of lock at lower end of side-cut ......
			BALDWINSVILLE SIDE-CUT LEVEL, $46\frac{20}{100}$ CHAINS.
......	5.83	.....	Side-cut lock (wood), ten feet lift, westward
1	6.08	20.50	Swing-bridge (to saw mill) ....
2	6.21	10.30	Swing-bridge (to flour mill) Wilkins.......
3	6.29	6.00	Swing-bridge (to flour mill) Frazee ....
4	.....	.....	Swing-bridge, railroad bridge ....
5	6.38	7.10	Bridge street (Baldwinsville) wrought-iron..
......	6.43	3.00	Guard-gates at dam ....
......	.....	.....	River dam, 385 feet long................
6	18.16	.....	Bridge at Jack's reefs....................
	From Oswego river (Three River Point).		ONEIDA RIVER IMPROVEMENT, FROM THREE RIVER POINT TO BREWERTON, TWENTY MILES. The structures are:
......	.....	.....	R., W. & O. R. R. bridge................
......	.....	.....	One tree dam at Oak Orchard.............
......	8.13	.....	One steamboat lock at Oak Orchard 120 feet long and thirty feet wide, three-feet lift.... ....
1	.....	.....	One swing-bridge ninety-five feet long, forty-five feet opening at Oak Orchard........
......	.....	.....	One crib and stone dam at Caughdenoy....
......	14.49	.....	One steamboat lock at Caughdenoy 120 feet long, thirty feet wide, three-feet lift .....
2	.....	.....	One swing-bridge over lock, thirty-one feet opening ....
			N. Y., O. & W. R. R. bridge...... ......
3	18.79	.....	One swing bridge at Brewerton eighty-five feet long, forty-five feet opening ....

on the Oswego canal and the structures on each in their order.
Erie and Oswego canals at Syracuse.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1865
......	Wood	$19\frac{10}{12}$	1	$11\frac{5}{12}$	....	......	....	....
......	Wood	$25\frac{8}{12}$	1	$9\frac{4}{12}$	....	......	....	....
......	Wood	$21\frac{10}{12}$	1	$11\frac{2}{12}$	....	......	....	....
......	Wood	26	1	$14\frac{4}{12}$	1	$3\frac{4}{12}$	....	....
Iron ..	.....	$45\frac{1}{12}$	1	$26\frac{1}{12}$	2	$9\frac{10}{12}$	....	1870
......	.....	......	....	......	....	......	....	1867
......	.....	......	....	......	....	......	....	....
Iron ..	.....	98	....	......	....	......	....	1887
Iron ..	.....	......	1	......	....	......	....	1891
......	.....	......	....	......	....	......	....	1867
......	.....	......	....	......	....	......	....	....
......	Wood	45	1	......	....	......	....	1885
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	31	1	......	....	......	....	1888
......	Iron ..	......	1	......	....	......	....	1882
......	Iron .	45	1	14	....	......	....	1883

TABLE No. 4 — (Continued) — *Showing the length of the levels on the Cayuga and their structures, each in their order, including the Cayuga*

Number of structure.	Cumulative distance in miles from Erie canal.	Distances in chains and links.	GENERAL DESCRIPTION.
			SENECA LAKE LEVEL No. 1, $630\frac{61}{100}$ CHAINS.
......	20.88	.....	Piers in harbor at Geneva................
......	20.54	27.80	Tow-path bridge No. 1 over Castle creek, Geneva (stringers) ....
1	20.51	2.50	Lake street bridge, Geneva (Whipple arch).
......	.....	.....	Iron-truss carrier to malt house (private)...
......	20.13	29.85	Tow-path bridge, No. 2, four spans (pile bents)
2	19.99	11.70	Evans street bridge (Whipple arch)........
3	19.63	28.35	Pre-emption road bridge (Whipple arch)...
......	19.45	14.90	Tow-path bridge No. 3, twenty-two spans pile bents) ....
......	.....	.....	Three sluices ....
4	18.74	55.70	Teal's road bridge (Whipple arch).........
5	18.37	.....	New outlet bridge ....
......	.....	.....	Geneva, Ithaca and Sayre railroad bridge...
......	.....	.....	Van Ettenville railroad bridge............
......	.....	.....	Eight sluices ....
......	14.10	371.85	Tow-path bridge No. 4, over White creek (stringer) ....
......	.....	.....	One sluice..............................
D. 1	.....	50.55	Waterloo stone dam, 130½ feet long ....
6	13.44	2.10	Locust street road and change bridge (Whipple arch)...................
......	.....	14.45	Tow-path bridge No. 5, over factory flume, two spans.......... ....
7	13.23	2.50	Virginia street bridge, Waterloo (Whipple arch) ....
......	.....	.....	Two sluices ....
......	13.00	18.42	Foot of lock No. 1, $7\frac{28}{100}$ feet lift, westward.
			LEVEL No. 2, $212\frac{60}{100}$ CHAINS.
8	.....	6.25	Swift street bridge (Whipple arch)........
......	.....	3.40	Tow-path No. 6, draw-bridge to dry dock..
......	12.84	2.95	Foot of lock No. 2, seven-feet lift, westward
			LEVEL No. 3, $261\frac{45}{100}$ CHAINS.
......	.....	3.65	Tow-path bridge No. 7, four bents ....
9	.....	13.50	Gorham road bridge.....................
......	.....	3.10	Tow-path bridge No. 8, four bents ....
......	12.39	16.20	Tow-path bridge No. 9, over Silver creek .. (stringer) ....
10	11.14	99.60	Kingdom road bridge....................
......	10.60	43.50	Tow-path bridge No. 10, over Sackett's creek, (stringer) ....

and Seneca canal from Geneva to the junction of the Erie canal at Montezuma, side cut from Mud lock to Cayuga bridge and Cayuga inlet.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	15	1	12	....	......	....	....
Iron ..	.....	$69\frac{1}{12}$	2	$17\frac{10}{12}$	2	$6\frac{6}{12}$	....	....
......	.....	......	....	......	....	......	....	....
......	.....	$60\frac{1}{12}$	1	$12\frac{2}{12}$	....	......	....	....
Iron ..	.....	$79\frac{11}{12}$	1	18	....	......	....	1873
Iron ..	.....	$70\frac{10}{12}$	1	19	....	......	....	1881
......	.....	265	1	$15\frac{3}{12}$	....	......	....	1874
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{2}{12}$	1	18	....	......	....	1874
Iron ..	.....	......	....	......	....	......	....	1869
......	Iron .	$84\frac{3}{12}$	1	$15\frac{6}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1892
......	.....	......	....	......	....	......	....	....
......	.....	19	1	12	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1885
Iron ..	.....	$83\frac{11}{12}$	1 1	17 $8\frac{3}{12}$		......	....	1870
......	.....	$21\frac{10}{12}$ $21\frac{4}{12}$	1	$12\frac{6}{12}$	....	......	....	....
Iron ..	.....	$83\frac{6}{12}$	2	18	2	$6\frac{10}{12}$	....	1890
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$70\frac{3}{12}$	1	$18\frac{8}{12}$	....	......	....	1890
......	.....	$21\frac{8}{12}$	1	$11\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1870
......	Wood	$113\frac{6}{12}$	1	$9\frac{3}{12}$	....	......	....	1887
......	Wood	$75\frac{1}{12}$	1	$18\frac{2}{12}$	....	......	....	1882
......	Wood	$151\frac{1}{12}$	1	$9\frac{4}{12}$	....	......	....	1881
......	.....	$30\frac{5}{12}$	1	$10\frac{1}{12}$	....	......	....	....
......	Wood	$73\frac{5}{12}$	1	$16\frac{9}{12}$	....	......	....	1883
......	.....	$17\frac{7}{12}$	1	$11\frac{1}{12}$	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles from Erie canal.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 3 — (*Concluded*).
......	.....	.....	Sodus Bay railroad bridge............ ....
11	9.71	70.90	Bridge street, Seneca Falls (Whipple arch)..
D. 2	.....	3.90	Seneca Falls stone dam, 180 feet long......
S. 1	.....	1.30	Spillway on tow-path side.................
......	9.58	5.80	Foot of lock No. 3, ten-feet lift, westward..
			LEVEL No. 4, $7\frac{78}{100}$ CHAINS.
S. 2	.....	.....	Spillway, stone, on berme.................
......	....	3.80	Tow-path bridge, No. 11, two spans........
......	9.48	3.92	Foot of lock No. 4, nine-feet lift, westward..
			LEVEL No. 5, $9\frac{15}{100}$ CHAINS.
12	.....	0.63	Ovid street bridge, Seneca Falls (deck truss).
......	9.36	8.52	Foot of lock No. 5, nine-feet lift, westward..
			LEVEL No. 6, 35 CHAINS.
S. 3	.....	10.73	Spillway, 217 feet long (berme)...........
13	.....	8.40	Seneca street, change and road bridge......
......	8.91	15.87	Foot of lock No. 6, $9\frac{60}{100}$ feet lift, westward.
			LEVEL No. 7, $38\frac{55}{100}$ CHAINS.
......	.....	8.68	Tow-path bridge No. 12, five spans.... ...
D. 3	.....	2.50	Dam 217 feet long......................
......	8.44	27.37	Foot of lock No. 7, six-feet lift, westward..
			LEVEL No. 8, $267\frac{3}{100}$ CHAINS.
......	.....	.....	Six sluices through tow-path..............
......	.....	136.13	N. Y. C. and H. R. R. R. bridge, old road..
......	.....	.....	One sluice through tow-path..............
14	6.74	22.50	Demont's road bridge....................
D. 4	.....	15.60	River dam, loose stone on berme side......
......	5.11	92.80	Foot of lock No. 8, $5\frac{70}{100}$ feet lift, westward.
			LEVEL No. 9, $9\frac{70}{100}$ CHAINS.
......	.....	.....	This level crosses Cayuga outlet on same level with Cayuga lake.................
......	.....	7.10	Tow-path bridge No. 13, over outlet (stone abutments, five spans).................
......	4.99	2.60	Head of lock No. 9, ten-feet lift, eastward..
			LEVEL No. 10, $391\frac{54}{100}$ CHAINS.
15	.....	1.65	Change bridge at junction with the Cayuga side-cut ....

of the levels on the Cayuga and Seneca canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
Wood.	.....	......	....	......	....	......	....	....
Iron..	.....	$72\frac{7}{12}$	2	$15\frac{10}{12}$	2	$8\frac{4}{12}$	....	1872
......	.....	......	....	......	....	......	....	1882
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1870
......	.....	......	....	......	....	......	....	.....
......	Wood	$\left\{\begin{matrix}51\frac{10}{12}\\42\frac{4}{12}\end{matrix}\right.$	$\left.\right\}$ 1	$10\frac{1}{12}$	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	Iron.	$52\frac{10}{12}$	1	26	2	9	....	1871
......	.....	......	...	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Iron.	$74\frac{4}{12}$	1	20	....	......	....	1891
......	.....	......	....	......	....	......	....	....
......	Wood	$233\frac{6}{12}$	1	$11\frac{3}{12}$	....	......	....	1885
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1888
......	Iron.	$105\frac{10}{12}$	1	$14\frac{7}{12}$	....	......	....	1870
......	.....	......	....	......	....	......	....	1888
......	Wood	$69\frac{9}{12}$	1	$16\frac{4}{12}$	....	......	....	1882
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	....
......	Wood	$259\frac{9}{12}$	1	$10\frac{11}{12}$	....	......	....	1887
......	.....	......	....	......	....	......	....	1870
......	Wood	$71\frac{6}{12}$	1	$12\frac{3}{12}$	....	......	....	1879.

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles from Erie canal.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 10, 391 $\frac{54}{100}$ CHAINS—(*Continued*).
16	3.85	89.05	Free road bridge (Whipple arch)..........
C. 1	.....	.....	Diving culvert (small) ....
17	3.56	23.40	Stahlnecker's farm bridge ....
2 to 8	.. ..	.....	Seven diving culverts (small) ....
18	0.54	241.50	Ransom's road bridge....................
C. 9	.....	30.86	Diving culvert..........................
......	0.09	5.08	Head of lock No. 11, three-feet lift eastward
			LEVEL No. 11, MONTEZUMA, 7 $\frac{36}{100}$ CHAINS.
......	.....	7.36	Junction with Erie canal ....
			CAYUGA BRANCH LEVEL No. 10, 140 $\frac{97}{100}$ CHAINS.
......	4.97	.....	Junction with main line.................
......	.....	3.15	Waste-weir............................
......	.....	137.82	Head of lock No. 10, ten-feet lift eastward .
			CAYUGA LAKE LEVEL, 27 $\frac{78}{100}$ CHAINS.
19	.....	1.00	Swing-bridge over lock chamber ....
......	.....	14.87	Towpath bridge No. 14 ....
......	.....	1.60	N. Y. C. and H. R. R. R. bridge (old road) lift-bridge ....
......	.....	0.40	Pier at Cayuga, 654 feet long............
......	.....	9.91	Cayuga harbor.........................
			CAYUGA INLET.
.. ...	.....	.....	One main pier, 1,000 feet long, at Ithaca ...
......	.....	.....	One breakwater, 306 feet long, at Ithaca ...
......	.....	.....	One light-house at Ithaca.................
1	.....	.....	Iron swing-bridge at Buffalo street, Ithaca..
2	.....	.....	Iron swing-bridge at Seneca street, Ithaca..
3	.....	.....	Iron swing-bridge at State street, Ithaca....

of the levels on the Cayuga and Seneca canals, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
Iron..	.....	$76\frac{5}{12}$	1	$18\frac{10}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	72	1	$12\frac{10}{12}$	....	......	....	1878
......	.....	......	....	......	....	......	....	....
......	Wood	$71\frac{10}{12}$	1	17	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1870
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	.....	....	......	....	1889
......	.....	......	....	......	....	......	....	1889
......	.....	......	....	......	...	......	....	....
......	.....	......	....	......	....	......	....	1889
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length of the levels*

(From the intersection

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 1, $6\frac{40}{100}$ CHAINS.
......	.....	.....	Junction with Erie canal..................
1	.....	0.50	Whitesboro street bridge, Rome, stone abutments (Whipple arch)..................
			LEVEL No. 2, $16\frac{80}{100}$ CHAINS.
......	0.08	5.90	Foot of lock No. 1, ten-feet lift, northward.
2	.....	4.22	Dominick street bridge, Rome, stone abutments (Whipple arch)...............
			LEVEL No. 3, $13\frac{83}{100}$ CHAINS.
......	0.29	12.58	Foot of lock No. 2, ten-feet lift, northward.
3	.....	10.36	Stanwix street bridge, stone abutments (Whipple arch)....................
			LEVEL No. 4, $32\frac{14}{100}$ CHAINS.
......	0.44	3.47	Foot of lock No. 3, ten-feet lift, northward.
4	.....	4.53	Thomas street bridge, stone abutments (iron chords) ....
5	.....	.....	Bloomfield street bridge, stone abutments..
			LEVEL No. 5, $52\frac{68}{100}$ CHAINS.
......	0.86	27.61	Foot of lock No. 4, ten-feet lift, northward.
6	.....	50.70	Huntington farm bridge (on bents, iron chords) ....
			LEVEL No. 6, $54\frac{99}{100}$ CHAINS.
......	1.52	1.98	Foot of lock No. 5, ten-feet lift, northward.
7	2.12	48.03	Dunham farm bridge (stone abutments on tow-path side and bents on berme side) ..
			LEVEL No. 7, $226\frac{97}{100}$ CHAINS.
......	.....	6.96	Foot of lock No 6, ten-feet lift, northward.
8	2.51	23.99	Water-works bridge (stone abutments) Whipple arch.......................
9	.....	.....	Farm bridge (on bents), Crowells..........
10	.....	.....	Farm bridge (on bents), Wilcox ....
C. 1	3.49	78.18	Culvert (arch) ....
S. 1	.....	0.75	Spillway (near culvert)..................
11	.....	.....	Farm bridge (on bents), Adams...........
12	.....	.....	Farm bridge (on bents), Hicks...........
13	5.00	120.31	Road bridge near river crossing (on bents).

on Black River canal and the structures on each in their order.
with Erie canal at Rome.)

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$71\frac{9\frac{1}{2}}{12}$	1	$18\frac{10}{12}$	1	$7\frac{6}{12}$	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$55\frac{3}{12}$	2	$13\frac{6}{12}$ $13\frac{6}{12}$	2	$6\frac{6}{12}$ $6\frac{4}{12}$	......	1870
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$50\frac{7}{12}$	1	$18\frac{9}{12}$	2	$6\frac{2}{12}$ $6\frac{4}{12}$	......	....
......	.....	......	....	......	....	......	....	....
......	Wood	$49\frac{11}{12}$	1	$13\frac{11}{12}$	1	$5\frac{6}{12}$	....	1886
......	Iron.	$48\frac{10}{12}$	1	$19\frac{8}{12}$	2	$7\frac{6}{12}$	....	....
......	....	......	....	......	....	......	....	....
......	Wood	$51\frac{10}{12}$	1	$11\frac{11}{12}$	...	......	....	1888
......	.....	......	....	......	....	......	....	....
......	Wood	$43\frac{6}{12}$	1	$13\frac{4}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$48\frac{5}{12}$	1	$18\frac{2}{12}$	....	......	....	....
......	Wood	$49\frac{11}{12}$	1	12	....	......	....	1885
......	Wood	51	1	12	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	...	......	....	....
......	Wood	$50\frac{1}{12}$	1	$12\frac{2}{12}$	....	......	....	1888
......	Wood	$50\frac{3}{12}$	1	12	....	.....	....	1885
......	Wood	$48\frac{10}{12}$	1	12	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 8, $40\frac{2}{100}$ CHAINS.
......	5.05	3.74	Foot of lock No. 7, ten-feet lift, northward.
			LEVEL No. 9, $10\frac{84}{100}$ CHAINS.
......	5.55	40 02	Foot of lock No. 8, eleven-feet lift, northward
A. 1	.....	5.00	Mohawk aqueduct, stone abutments and wooden trunks, four spans, forty feet each; piers five feet wide....................
......	.....	3.56	Delta feeder is taken into the canal seventy-five links north of the aqueduct.........
			LEVEL No. 10, $11\frac{4}{100}$ CHAINS.
......	5.68	2.28	Foot of lock No. 9, twelve-feet lift, northward
			LEVEL No. 11, $12\frac{43}{100}$ CHAINS.
......	5.82	11.04	Foot of lock No. 10, eleven-feet lift, northward..............................
14	.....	6.59	Change and road bridge (on bents), Walworth's............................
			LEVEL No. 12, $8\frac{29}{100}$ CHAINS.
......	5.98	5.84	Foot of lock No. 11, eleven-feet lift, northward
			LEVEL No. 13, $36\frac{86}{100}$ CHAINS.
......	6.08	8.29	Foot of lock No. 12, eleven-feet lift, northward
15	.....	34.58	Road bridge (stone abutments) ....
			LEVEL No. 14, $168\frac{30}{100}$ CHAINS.
......	6.54	2.28	Foot of lock No. 13, eight-feet lift, northward
A. 2	.....	.....	Aqueduct over old B. R. & O. R. R. cutting (one span, stone abutments, wooden trunk)
16	6.85	24.78	Farm bridge (stone abutments) iron chords (private)............................
17	7.34	48.82	Farm bridge (on bents), Wager...........
18	7.92	36.70	Farm bridge (on bents), Brayton..........
S. 2	.....	16 25	Spillway..............................
19	8.24	9.44	South road bridge at Westernville (stone abutments), tubular ....
20	.....	28.61	Road bridge (on bents) Floyd ....
			LEVEL No. 15, $10\frac{90}{100}$ CHAINS.
......	8.64	3.20	Foot of lock No. 14, eight-feet lift, northward
			LEVEL No. 16, $12\frac{87}{100}$ CHAINS.
......	8.78	10.90	Foot of lock No. 15, eight-feet lift, northward

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$48\frac{9}{12}$	1	$11\frac{8}{12}$	....	......	....	1885
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1890
......	Wood	$49\frac{7}{12}$	1	$16\frac{2}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	.....	....	....
......	Wood	$46\frac{11}{12}$	1	$11\frac{5}{12}$	....	......	....	....
......	Wood	$49\frac{8}{12}$	1	$11\frac{7}{12}$	....	......	....	....
......	Wood	$50\frac{1}{12}$	1	12	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$48\frac{4}{12}$	1	$18\frac{8}{12}$	....	......	....	1882
......	Wood	$49\frac{5}{12}$	1	$11\frac{10}{12}$	....	......	....	1886
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	.....	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 17, $119\frac{23}{100}$ CHAINS.
......	8.94	12.87	Foot of lock No. 16, ten-feet lift northward.
21	.....	7.24	Westernville road bridge (stone abutments) iron chord..........................
22	9.63	47.74	Farm bridge (on bents), Waldo...........
23	.....	17.50	Farm bridge (on bents) iron chords (Beckwith).............................
			LEVEL No. 18, $48\frac{26}{100}$ CHAINS.
......	10.43	46.75	Foot of lock No. 17, eight-feet lift northward.
A. 3	.....	4.52	Aqueduct (Willis creek), stone abutments and piers, wood trunks, six spans, eighteen feet; each pier five feet wide............
24	.....	.....	Waldo South Farm bridge (on bents)......
25	.....	.....	Farm bridge (on bents). Waldo (north)....
			LEVEL No. 19, $19\frac{94}{100}$ CHAINS.
......	11.04	43.74	Foot of lock No. 18, ten-feet lift, northward.
26	.....	.....	Farm bridge (on bents) Utley ....
			LEVEL No. 20, $12\frac{95}{100}$ CHAINS.
......	11.28	19.94	Foot of lock No. 19, eight-feet lift, northward
			LEVEL No. 21, $11\frac{83}{100}$ CHAINS.
......	11.44	12.95	Foot of lock No 20, ten-feet lift, northward.
C. 2	.....	4.66	Utley culvert..........................
			LEVEL No. 22, $44\frac{20}{100}$ CHAINS.
......	11.59	7.17	Foot of lock No 21, ten-feet lift, northward.
27	.....	9.80	Old plank-road bridge (stone abutments), (Whipple arch)......................
28	.....	.....	Farm bridge, dry stone abutments, (Buck Hill) ....
			LEVEL No. 23, $69\frac{44}{100}$ CHAINS.
......	12.15	34.49	Foot of lock No. 22, ten-feet lift, northward.
A. 4	.....	4.34	Aqueduct (Stringer creek) stone abutments and piers, wood trunk, four spans eighteen feet each; piers five feet wide.......
29	.....	6.80	Side Hill road bridge (stone abutments), Whipple arch.......................
			LEVEL No. 24, $29\frac{10}{100}$ CHAINS.
......	13.02	58.30	Foot of lock No. 23, ten-feet lift, northward.

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	...	......	....	....
......	Wood	$58\frac{10}{12}$	1	$16\frac{9}{12}$	....	......	....	1888
......	Wood	$49\frac{4}{12}$	1	12	....	......	....	....
......	Wood	$50\frac{5}{12}$	1	$12\frac{2}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1885
......	Wood	$49\frac{6}{12}$	1	$12\frac{2}{12}$	....	....	....	1886
......	Wood	$50\frac{3}{12}$	1	$11\frac{6}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	50	1	$11\frac{8}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
.....	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
Iron ..	.....	$49\frac{2}{12}$	1	$18\frac{10}{12}$	2	$6\frac{2}{21}$	....	....
......	Wood	$48\frac{5}{12}$	1	12	....	......	....	1865
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$51\frac{2}{12}$	1	16	....	......	....	1883
......	......	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 25, $39\frac{55}{100}$ CHAINS.
......	13.38	29.10	Foot of lock No. 24, ten-feet lift, northward.
30	.....	17.80	Road and change-bridge (on bents)........
......	.....	.....	Sluice on tow-path side (stone abutments) ..
			LEVEL No. 26, $30\frac{52}{100}$ CHAINS.
......	13.87	21.75	Foot of lock No. 25, ten-feet lift, northward.
A. 5.	.....	3.45	Aqueduct, Lansingkill, stone abutments, wood trunks, six spans, eighteen feet each, five piers..........................
			LEVEL No. 27, $29\frac{93}{100}$ CHAINS.
......	14.26	27.07	Foot of lock No. 26, ten-feet lift, northward.
			LEVEL No. 28, $22\frac{97}{100}$ CHAINS.
......	14.63	29.93	Foot of lock No. 27, ten-feet lift, northward.
			LEVEL No. 29, $12\frac{16}{100}$ CHAINS.
......	14.92	22.97	Foot of lock No. 28, ten-feet lift, northward.
			LEVEL No. 30, $34\frac{99}{100}$ CHAINS.
......	15.07	.....	Foot of lock No. 29, ten-feet lift, northward.
C. 3	.....	5.29	Culvert (arch)..........................
31	.....	3.80	Road bridge (on bents), Hall.............
			LEVEL No. 31, $16\frac{60}{100}$ CHAINS.
......	15.51	25.90	Foot of lock No. 30, ten-feet lift, northward.
			LEVEL No. 32, $33\frac{40}{100}$ CHAINS.
......	15.71	16.60	Foot of lock No. 31, ten-feet lift, northward.
C. 4	.....	3.49	Culvert (arch)..........................
			LEVEL No. 33, 31 CHAINS.
......	16.13	29.91	Foot of lock No. 32, ten-feet lift, northward.
			LEVEL No. 34, $17\frac{82}{100}$ CHAINS.
......	16.52	31 00	Foot of lock No. 33, ten-feet lift, northward.
B. H. 1	.....	15.72	Lansingkill dam and feeder on tow-path, side abutments of dam and bulkhead of stone masonry ....
			LEVEL No. 35, $12\frac{52}{100}$ CHAINS.
......	16.74	2.10	Foot of lock No. 34, ten-feet lift, northward.

of the levels on the Black river canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	Wood	$49\frac{5}{12}$	1	$13\frac{8}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	...
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	...	......	....	1886
......	.....	......	....	......	....	......	....	....
......	Wood	$48\frac{9}{12}$	1	13	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	...	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	...
......	.....	......	....	......	....	......	....	1881
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 36, $10\frac{99}{100}$ CHAINS.
......	16.90	12.52	Foot of lock No. 35, ten-feet lift, northward.
			LEVEL NO. 37, $11\frac{83}{100}$ CHAINS.
......	17.04	10.99	Foot of lock No. 36, ten-feet lift, northward.
C. 5	.....	4.00	Culvert (arch) .. ..
			LEVEL NO. 38, $12\frac{17}{100}$ CHAINS.
......	17.18	7.83	Foot of lock No. 37, ten-feet lift, northward.
			LEVEL NO. 39, $15\frac{74}{100}$ CHAINS.
......	17.34	12.17	Foot of lock No. 38, ten-feet lift, northward.
S. 3	.....	.....	Spillway, tow-path side ....
......	17.53	15.74	Foot of lock No. 39.....................
......	.....	.....	Combined locks, No. 39, 40, 41, 42 and 43, each ten-feet lift northward ....
			LEVEL NO. 40, $18\frac{50}{100}$ CHAINS.
......	.....	5.45	Foot of lock No. 43......................
......	17.83	18.50	Foot of lock No. 44 ....
......	.....	.....	Combined locks Nos. 44, 45 and 46, each ten-feet lift northward ....
			LEVEL NO. 41, $33\frac{45}{100}$ CHAINS.
......	.....	2.72	Foot of lock No. 46 ....
32	.....	.....	Tutts' road bridge (above three combined) stone abutments......................
			LEVEL NO. 42, $26\frac{70}{100}$ CHAINS.
......	18.28	33.45	Foot of lock No. 47, ten-feet lift, northward.
33	.....	.....	Road bridge (Hart) ....
B. H. 2	.....	.....	Bulkhead on tow-path side ....
			LEVEL NO. 43, $9\frac{11}{100}$ CHAINS.
......	18.62	26.70	Foot of lock No. 48, ten-feet lift, northward.
			LEVEL NO. 44, $8\frac{68}{100}$ CHAINS.
......	18.73	9.11	Foot of lock No. 49, ten-feet lift, northward.
			LEVEL NO. 45, $18\frac{40}{100}$ CHAINS.
......	18.84	8.68	Foot of lock No. 50, ten-feet lift, northward.
			LEVEL NO. 46, $15\frac{2}{100}$ CHAINS.
......	19.07	18.40	Foot of lock No. 51, ten-feet lift, northward.

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$49\frac{4}{12}$	1	12	....	......	....	1883
......	.....	......	....	......	....	......	....	....
......	Wood	$49\frac{4}{12}$	1	$11\frac{8}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1888
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 47, 9$\frac{23}{100}$ CHAINS.
......	19.23	15.02	Foot of lock No. 52, ten-feet lift, northward.
			LEVEL NO. 48, 13$\frac{38}{100}$ CHAINS.
......	19.37	9.23	Foot of lock No. 53, ten-feet lift, northward.
34	.....	.....	Road bridge (on bents), Yerden...........
			LEVEL NO. 49, 16$\frac{20}{100}$ CHAINS.
......	19.54	13.38	Foot of lock No. 54, ten-feet lift, northward.
C. 6	.....	14.66	Culvert (arch) ....
			LEVEL NO. 50, 9$\frac{33}{100}$ CHAINS.
......	19.74	1.54	Foot of lock No. 55, ten feet lift, northward.
			LEVEL NO. 51, 16$\frac{63}{100}$ CHAINS.
......	19.86	9.33	Foot of lock No. 56, ten-feet lift, northward.
			LEVEL NO. 52, 15$\frac{28}{100}$ CHAINS.
......	20.07	16.63	Foot of lock No. 57, ten-feet lift, northward.
......	20.26	15.28	Foot of lock No. 58 ....
......	.....	.....	Combined locks Nos. 58, 59 and 60, each ten-feet lift, northward.................
			LEVEL NO. 53, 21$\frac{14}{100}$ CHAINS.
......	.....	2.73	Foot of lock No. 60.. ....
			LEVEL NO. 54, 21$\frac{20}{100}$ CHAINS.
......	20.56	21.14	Foot of lock No. 61, ten-feet lift, northward.
			LEVEL NO. 55, 23$\frac{20}{100}$ CHAINS.
......	20.82	21.28	Foot of lock No. 62, ten-feet lift, northward.
B. H. 3	.....	12.40	Bulkhead and waste-weir into Lansingkill feeder ....
			LEVEL NO. 56, 10$\frac{6}{100}$ CHAINS.
......	21.11	10.80	Foot of lock No. 63, ten-feet lift, northward.
			LEVEL NO. 57, 43$\frac{41}{100}$ CHAINS.
......	21.24	10.06	Foot of lock No. 64, ten-feet lift, northward.
35	.....	.....	Diefendorf road bridge (on bents).........
			LEVEL NO. 58, 25$\frac{32}{100}$ CHAINS.
......	21.78	43.41	Foot of lock No. 65, ten-feet lift, northward.

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......		......	....	......	....	......	....	....
......	Wood	$49\frac{1}{12}$	1	$12\frac{1}{12}$	....	......	....	1885
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	Lock 60, 1889
......	.....	......	....	......	....	......	....	....
......	....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	50	1	$11\frac{9}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 59, $25\frac{82}{100}$ CHAINS.
......	22.10	25.32	Foot of lock No. 66, ten-feet lift, northward
			LEVEL NO. 60, $8\frac{91}{100}$ CHAINS.
......	22.42	25.82	Foot of lock No. 67, ten-feet lift, northward
			LEVEL NO. 61, $9\frac{1}{100}$ CHAINS.
......	22.53	8.91	Foot of lock No. 68, nine-feet lift, northward
			LEVEL NO. 62, $14\frac{9}{100}$ CHAINS.
......	22.64	9.01	Foot of lock No. 69, nine-feet lift, northward
36	.....	5.54	Baker road bridge (road Boonville to Rome) stone abutments (Whipple arch).........
			LEVEL NO. 63, $184\frac{61}{100}$ CHAINS.
......	22.82	8.55	Foot of lock No. 70, nine-feet lift, northward ....
B. H. 4	.....	10.58	Bulkhead on tow-path side (head of Lansingkill feeder)........................
......	.....	.....	Black River railroad bridge (stone abutments) ....
......	.....	.....	Stringer bridge (on tow-path).............
37	24.16	96.45	Owen's farm bridge (on bents)............
38	24.73	45.43	Turnpike bridge, Boonville (stone abutments), Whipple arch ....
39	.....	20.64	Black river feeder bridge (wooden bents) tubular arch.........................
B. H. 5	.....	7.24	Bulkhead and waste-weir, tow-path side, stone abutments......................
			LEVEL NO. 64, $39\frac{83}{100}$ CHAINS.
......	25.13	4.27	Head of lock No. 71, ten-feet lift southward.
40	.....	2.40	Main street bridge, Boonville (stone abutments), Whipple arch.................
C. 7	.....	4.73	Culvert (arch), ten-feet chord............
			LEVEL NO. 65, $55\frac{94}{100}$ CHAINS.
......	25.63	32.70	Head of lock No. 72, ten-feet lift, southward
C. 8	.....	5.30	Culvert (arch)..........................
41	.....	.....	Farm bridge (on bents) ....
42	.....	.....	Farm bridge (on bents), Jackson..........
			LEVEL NO. 66, $11\frac{96}{199}$ CHAINS.
......	26.33	50.64	Head of lock No. 73, ten-feet lift, southward

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	.....	....	....
......	......	......	....	......	....	......	....	....
Iron. .	......	$50\frac{3}{12}$	1	$12\frac{11}{12}$	....	......	....	1887
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	1889
......	.....	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	Wood	$51\frac{10}{12}$	1	$11\frac{11}{12}$	....	......	....	1886
Iron. .	......	$55\frac{7}{12}$	1	$19\frac{2}{12}$	2	$5\frac{4}{12}$	....	....
Iron. .	......	$60\frac{7}{12}$	1	$17\frac{6}{12}$	....	......	....	1882
......	......	......	....	......	....	......	....	1886
......	......	......	....	......	....	......	....	....
Iron. .	......	$52\frac{7}{12}$	1	18	2	$4\frac{6}{12}$	....	1890
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	Wood	$50\frac{4}{12}$	1	12	....	......	....	....
......	Wood	$50\frac{4}{12}$	1	$12\frac{1}{12}$	....	......	....	....
......	......	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 67, $54\frac{85}{100}$ CHAINS.
......	26.47	11.96	Head of lock No. 74, ten-feet lift, southward.
43	.....	25.05	Carpenter's farm bridge (on bents), iron chords ....
			LEVEL NO. 68, $13\frac{7}{100}$ CHAINS.
......	27.16	29.80	Lock No. 75, ten-feet lift, southward.......
......	27.32	13.07	Head of lock No. 76.....................
......	.....	.....	Combined locks Nos. 76, 77, 78 and 79, each ten-feet lift, southward ....
			LEVEL NO. 69, $40\frac{82}{100}$ CHAINS.
......	.....	4.09	Head of lock No. 79.....................
44	27.74	29.17	John Jackson's farm bridge (on bents).....
			LEVEL NO. 70, $11\frac{60}{100}$ CHAINS.
......	27.89	11.65	Head of lock No. 80, nine-feet lift, southward,
......	28.03	11.60	Head of lock No. 81.....................
......	.....	.....	Combined locks Nos. 81, 82, 83 and 84, each nine-feet lift, southward................
			LEVEL NO. 71, $46\frac{22}{100}$ CHAINS.
......	.....	4.09	Head of lock No. 84.....................
......	.....	2.81	Sugar river feeder.......................
A. 6	.....	2.80	Sugar river aqueduct, stone abutments and piers, wood trunk, three spans forty feet each, piers five feet eleven inches wide............................
45	28.37	17.14	Randall road bridge, stone abutments, (Whipple arch) ....
			LEVEL NO. 72, $20\frac{29}{100}$ CHAINS.
......	28.66	23.47	Head of lock No. 85, ten-feet lift, southward,
46	.....	.....	Randall farm bridge (on bents)...........
			LEVEL NO. 73, $14\frac{70}{100}$ CHAINS.
......	28.91	20.29	Head of lock No. 86, eleven and one-half feet lift, southward ....
......	29.10	14.70	Head of lock No. 87 ....
......	.....	.....	Combined locks Nos. 87, 88, 89 and 90, each ten-feet lift, southward.................
			LEVEL NO. 74, $13\frac{64}{100}$ CHAINS.
......	.....	4.09	Head of lock No. 90 ....
47	.....	3.71	Malcolm farm bridge (on bents)...........

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	......	......	....	......	....	......	....	....
......	Wood	49	1	$13\frac{4}{12}$	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
.....	......	.....	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	Wood	$51\frac{1}{12}$	1	$11\frac{11}{12}$	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	1888 to 1890
Iron ..	.....	$50\frac{10}{12}$	1	$15\frac{2}{12}$	....	......	....	....
......	......	......	....	......	....	......	....	....
......	Wood	50	1	$12\frac{1}{12}$	....	......	....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
							....	....
......	......	......	....	......	....	......	....	....
......	......	......	....	......	....	......	....	....
......	Wood	$49\frac{11}{12}$	1	$12\frac{2}{12}$	....	......	....	....

TABLE No. 4 — (Continued) — *Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL NO. 75, $104\frac{67}{100}$ CHAINS.
......	29.32	9.93	Head of lock No. 91, ten-feet lift, southward,
48	.....	.....	Hulbertville farm bridge (on bents)........
49	.....	.....	David Jones farm bridge (on bents) ....
50	.....	.....	Benj. Jones farm bridge (on bents)........
			LEVEL NO. 76, $36\frac{3}{100}$ CHAINS.
......	30.63	104.67	Head of lock No. 92, ten-feet lift, southward,
51	.....	.....	Cooper farm bridge (on bents)............
52	.....	.....	Denslow farm bridge (on bents)...........
			LEVEL NO. 77, $28\frac{41}{100}$ CHAINS.
......	31.08	36.03	Head of lock No. 93, ten-feet lift, southward,
53	.....	.....	Jones farm bridge (on bents).............
			LEVEL NO. 78, $96\frac{91}{100}$ CHAINS.
......	31.43	28.41	Head of lock No. 94, ten-feet lift, southward,
B. H. 6	.....	6.72	Bulkhead and spillway (stone abutments) ..
C. 9	.....	.....	Arch culvert............................
54	.....	.....	Post farm bridge (on bents)..............
55	.....	.....	Fogarty farm bridge (on bents)...........
56	32.27	59.99	Main street bridge, Port Leyden, stone abutments (Whipple arch) ....
57	.....	.....	North St. bridge, Pt. Leyden, stone abut'mts
......	.....	.....	Gere's railroad swing bridge (private)......
			LEVEL NO. 79, $27\frac{64}{100}$ CHAINS.
......	32.64	30.20	Head of lock No. 95, ten-feet lift, southward,
C. 10	.....	4.59	Box culvert............................
			LEVEL NO. 80, $14\frac{7}{100}$ CHAINS.
......	32.99	23.05	Head of lock No. 96, ten-feet lift, southward,
			LEVEL NO. 81, $19\frac{97}{100}$ CHAINS.
......	33.16	14.07	Head of lock No. 97, ten-feet lift, southward,
58	.....	.....	Change-bridge, stone abutments...........
C. 11	.....	.....	Box culvert............................
			LEVEL NO. 82, $35\frac{87}{100}$ CHAINS.
......	33.41	19.97	Head of lock No. 98, ten-feet lift, southward,
59	.....	17.81	Road bridge, stone abutments, iron chords..
......	33.86	18.06	Head of lock No. 99.....................
......	.....	.....	Combined locks Nos. 99 and 100, each ten-feet lift, & 101, ten and one-half-ft. lift southw'd
			LEVEL NO. 83, $11\frac{27}{100}$ CHAINS.
......	.....	2.73	Head of lock No. 101....................
60	.....	.....	Philo Post's farm bridge (on bents).... ...

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	...	......	....	....
......	Wood	$50\frac{6}{12}$	1	$11\frac{11}{12}$	....	......	....	....
......	Wood	$51\frac{2}{12}$	1	$11\frac{11}{12}$	....	......	....	....
......	Wood	$50\frac{5}{12}$	1	$12\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$50\frac{5}{12}$	1	12	....	......	....	....
......	Wood	$50\frac{3}{12}$	1	12	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$49\frac{2}{12}$	1	$11\frac{11}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$50\frac{4}{12}$	1	$11\frac{11}{12}$	....	......	....	....
......	Wood	50	1	$11\frac{11}{12}$	....	......	....	....
Iron ..	.....	$52\frac{6}{12}$	1	$18\frac{11}{12}$	2	$5\frac{6}{12}$	....	1889
Iron ..	.....	$49\frac{4}{12}$	1	19	2	6	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	...	......	....	......	....	....
......	Wood	49	1	$13\frac{8}{12}$	....	......	....	....
.....	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$52\frac{1}{12}$	1	$16\frac{11}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	$51\frac{6}{12}$	1	$12\frac{1}{12}$	....	......	....	....

TABLE No. 4—(Continued)—*Showing the length*

Number of structure.	Cumulative distance in miles.	Distances in chains and links.	GENERAL DESCRIPTION.
			LEVEL No. 84, 87$\frac{44}{100}$ CHAINS.
......	34.04	11.27	Head of lock No. 102, ten and one-quarter feet lift, southward. (This is the river level, above Lyons Falls dam; towing-path follows the west bank for a distance of 44$\frac{62}{100}$ chains, to the side-cut around the falls)...
......	.....	54.08	Tow-path bridge (stringers)...............
61	35.02	24.46	Road and change-bridge, stone abutments (Whipple arch)......................
......	35.13	8.90	Head of lock No. 103....................
......	.....	.....	Combined locks No. 103, four-feet lift, and Nos. 104 and 105, each ten-feet lift, southward................ ....
			LEVEL No. 85, 17$\frac{16}{100}$ CHAINS.
......	.....	2.73	Head of lock No. 105....................
62	.....	5.31	Lyons Falls road bridge, stone abutments (Whipple arch).......................
......	35.38	11.85	Head of lock No. 106....................
......	.....	.....	Combined locks Nos. 106 and 107, each eleven-feet lift, southward.............
			LEVEL No. 86, 7$\frac{54}{100}$ CHAINS.
......	.....	1.36	Head of lock No. 107....................
B. H. 7	.....	4.25	Bulkhead and waste-weir on tow-path side..
63	.....	1.49	Lart road bridge (on bents)...............
......	35.49	1.80	Head of lock No. 108....................
......	.....	.....	Combined locks Nos. 108 and 109, each twelve feet lift, southward.............
......	35.52	2.73	Foot of lock No. 109....................
			The following structures are on the river above lock No. 103:
......	.....	.....	Dam at Lyon's Falls, 491 feet long, built of timber with stone abutments............
......	.....	.....	Bridges over Black and Moose rivers at their junction a short distance above the dam..
64	.....	.....	Black river bridge (two spans), iron chords.
65	.....	.....	Moose river bridge (two spans), iron chords.
66	.....	.....	Junction bridge (new), one span, over channel above Black and Moose river bridges.

*East. †West.

of the levels on the Black River canal, etc.

Arch truss.	Trapezoidal structure.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$52\frac{7}{12}$	1	18	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$51\frac{10}{12}$	1	13	1	$6\frac{6}{12}$	....	1885
......	.....	......	..	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1884
......	Wood	$51\frac{7}{12}$	1	12	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	...	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	*$89\frac{7}{12}$ †89	1	$17\frac{10}{12}$	....	......	....	....
......	Wood	*$89\frac{7}{12}$ †91	..	18	....	......	....	....
......	Wood	$42\frac{8}{12}$	1	‡26 §14 $\frac{7}{12}$	..	......	....	....

‡ North. § South.

TABLE No. 4—(Continued)—*Black river*

Number of structure.	GENERAL DESCRIPTION.
......	Foot of lock No. 109, Black River canal, at Lyons falls
1	Whittlesey's bridge, east span (Whipple arch)
......	Whittlesey's bridge, center span
......	Whittlesey's bridge, west span, swing
2	Glendale bridge, east span
......	Glendale bridge, center span
......	Glendale bridge, west span
......	Lock and dam at Otter creek
......	Lock and dam at Bush's
3	Beach's bridge, east span, swing
......	Beach's bridge, center span
......	Beach's bridge, west span
4	Illingsworth bridge, first, east span, swing
......	Illingsworth bridge, second span, iron chords
......	Illingsworth bridge, third span, iron chords
......	Illingsworth bridge, fourth, west span, iron chords
4½	Road bridge over Beaver river (two spans) at Naumberg
......	Road bridge over Beaver river, east span
......	Road bridge over Beaver river, west span
5	Castorland bridge, first, east span
......	Castorland bridge, second span
......	Castorland bridge, third span (Whipple arch)
......	Castorland bridge, fourth, west span, swing
......	Rome, Watertown and Ogdensburgh railroad bridge at Carthage, Utica branch, seven spans { 5 2 }
6	Carthage river bridge, first east span (King Bridge Co. arch),
......	Carthage river bridge, second span (King Bridge Co. arch)
......	Carthage river bridge, third span (King Bridge Co. arch)
......	Carthage river bridge fourth span (King Bridge Co. arch)
......	Carthage river bridge, fifth span (King Bridge Co. arch)
......	Carthage river bridge, sixth span (King Bridge Co. arch)
......	Carthage river bridge, seventh span (King Bridge Co. arch)
......	Dam at Carthage

improvement from Lyons Falls to Carthage.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
Iron ..	.....	$56\frac{6}{12}$	1	17	....	......	....	1879
......	Wood	$75\frac{4}{12}$	1	$17\frac{4}{12}$	....	......	....	....
......	Wood	$48\frac{8}{12}$	1	$14\frac{1}{12}$	....	......	....	1879
......	Wood	$90\frac{7}{12}$	1	$16\frac{11}{12}$	....	......	....	....
......	Wood	$90\frac{3}{12}$	1	$16\frac{11}{12}$	....	......	....	....
......	Wood	50	1	$13\frac{7}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1885
......	Iron .	$49\frac{8}{12}$	1	$13\frac{2}{12}$	....	......	....	....
......	Wood	$67\frac{6}{12}$	1	18	....	......	....	....
......	Wood	$67\frac{9}{12}$	1	18	....	......	....	....
......	Wood	48	1	$14\frac{9}{12}$	....	......	....	....
......	Wood	$69\frac{4}{12}$	1	$18\frac{1}{12}$	....	......	....	....
......	Wood	$69\frac{7}{12}$	1	$18\frac{1}{12}$	....	......	....	....
......	Wood	$68\frac{4}{12}$	1	$18\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	Wood	64	1	17	....	......	....	1885
......	Wood	$60\frac{10}{12}$	1	17	....	......	....	1885
......	Wood	$81\frac{8}{12}$	1	$16\frac{11}{12}$	...	......	....	....
......	Wood	$80\frac{5}{12}$	1	$16\frac{11}{12}$	....	......	....	....
Iron ..	.....	$84\frac{1}{12}$	1	18	....	......	....	....
......	Iron .	$50\frac{2}{12}$	1	$13\frac{6}{12}$	....	......	....	1888
......	.....	$\left\{\begin{array}{l}90\\80\end{array}\right.$	1 1	$15\frac{5}{12}$ $15\frac{5}{12}$	$\left.\right\}$ ..	......	....	....
Iron ..	.....	$49\frac{9}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
Iron .	.....	$67\frac{8}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
Iron ..	.....	$67\frac{8}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
Iron ..	.....	$72\frac{6}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
Iron ..	.....	$72\frac{1}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
Iron ..	.....	$67\frac{10}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
Iron ..	.....	$35\frac{1}{12}$	1	$17\frac{2}{12}$	1	$5\frac{8}{12}$	....	1879
......	.....	......	....	......	....	......	....	....

TABLE No. 4—(Continued)—*Delta feeder enters*

Number of structure.	Miles from canal.	GENERAL DESCRIPTION.
1	0.02	Road bridge at mouth of feeder (stringer) ....
2	0.66	Wadworth's farm bridge (on bents) ....
3	1.02	Ela road bridge (on bents)......................
......	1.07	Culvert ....
4	1 35	Dougal farm bridge (stringer) near lock) ....
......	1.40	Guard and lift-lock at head of feeder..............
5	.....	Bridge across Mohawk river (two spans) three chains below lock ....
......	.....	Crib dam across the Mohawk river, 234 feet long, 6... chains below lock.......................

Lansingkill feeder — This feeder turns the surplus water of the Black River singkill and Mohawk river into

Number.	Miles.	GENERAL DESCRIPTION.
......	.....	Bulkhead 10.58 chains north of lock No. 70, Black River canal................................
......	0.89	Bridge ....
......	1.44	Bridge ....
......	1.61	Bridge ....
......	2.00	Ends at Lansingkill Falls........................

Forestport feeder enters canal 11.51

Number of structure.	Miles from canal.	GENERAL DESCRIPTION.
1	.....	Manchester farm bridge (truss on bents)...........
2	0.82	Irvin road bridge (truss on bents) ....
B. H. 1	1.00	Pitcher bulkhead and spillway, tow-path side ......
3	1.26	Roberts road bridge (truss on bents)..............
4	1.42	Pitcher road bridge (truss on bents) ....
5	2.11	Bonfield road bridge (truss on bents) ....
6	3.21	Hawkinsville road bridge (stone abutments) ....
7	3.94	Lobdell road bridge (truss on bents) ....
C. 1	4.49	Slocum culvert ....

canal seventy-five feet north of Mohawk aqueduct.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	$18\frac{8}{12}$	1	$15\frac{8}{12}$	....	......	....	....
......	Wood	$40\frac{8}{12}$	1	$11\frac{10}{12}$	....	......	....	....
......	Wood	40	1	$11\frac{10}{12}$	....	......	....	....
......	.....	......	....	.....	....	......	....	....
......	.....	$16\frac{5}{12}$	1	$15\frac{10}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	1886

canal into the Lansingkill, near lock No. 70, and thence through the Lan-
the Erie canal at Rome.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	...	......	....	....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	....

chains south of lock No. 71

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Wood	$49\frac{10}{12}$	1	$11\frac{11}{12}$	....	......	....	....
......	Wood	$48\frac{5}{12}$	1	$16\frac{6}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	1882
......	Wood	$48\frac{11}{12}$	1	$12\frac{1}{12}$	....	......	....	....
......	Wood	$49\frac{8\frac{1}{2}}{12}$	1	$13\frac{11}{12}$	....	......	....	....
. ....	Wood	$48\frac{10}{12}$	1	$12\frac{4}{12}$	....	......	....	....
Iron . .	.....	$50\frac{1}{12}$	1	17	....	......	....	1886
......	Wood	$46\frac{8\frac{1}{2}}{12}$	1	$12\frac{1}{12}$	....	......	....	....
......	.....	......	....	......	....	......	....	....

TABLE No. 4 — (Concluded) — *Forestport feeder*

Number of structure.	Miles from canal.	GENERAL DESCRIPTION.
8	.....	Slocum farm bridge (truss on bents) ....
BH. 2	4.72	Lee bulkhead, on berme side....................
C. 2	4.75	Lee culvert................................
9	5.08	Lee road bridge (truss on bents)..................
10	.....	Town road bridge (truss on bents)................
BH. 3	.....	Evans' bulkhead ....
11	.....	Courtney road bridge (truss on bents)..... ....
C. 3	.....	Culvert......................................
BH. 4	9.39	Williams' bulkhead, near Forestport, tow-path side..
12	.....	Dutch Hill road bridge.........................
......	9.67	Guard-lock at entrance into pond..................
13	9.69	Road bridge (stone abutments), crosses directly over the guard-lock (iron chords)...................
......	.....	Forestport dam, 7 chains below feeder ....
		SUGAR RIVER FEEDER.
		Enters canal 1.25 chains north of lock No. 84.
......	0.14	Bulkhead and dam ....
		RESERVOIRS SUPPLYING FORESTPORT FEEDER.
......	9.67	Guard lock at head of feeder....................
	Approx.	
......	11.0	Head of pond................................
......	19½	White lake, dam and bulkhead....................
......	22	Chub lake, dam and bulkhead....................
......	27½	Sand lake, dam and bulkhead ....
Feed into Sand lake.	30	Third Bisby lake, bulkhead......................
	30¼	Dam at Old Outlet, Third Bisby lake ....
	31	Second and first Bisby lakes, dam and bulkhead....
	29½	Woodhull reservoir, dam and well-house, waste-weir and tender's house........................
......	33½	Twin lakes, dam and bulkhead..................
......	32½	North lake, dam and well-house and tender's house..
......	38½	Canachagala lake, bulkhead (feeds into North lake).
......	36	South lake, dam and well house..................
......	.....	Old Forge dam and bulkhead, Fulton chain........
......	.....	Sixth lake, dam and bulkhead....................
......	.....	Beaver River reservoir dam and bulkhead.........
		CHEMUNG CANAL.
......	.....	One iron swing-bridge at Watkins.............. One pier, three breakwaters, one light-house......

enters canal 11.51 *chains south of lock No.* 71.

Arch truss.	Trapezoidal truss.	Clear span of bridge.	Number of roadways.	Width of roadways on centers.	Number of sidewalks.	Width of sidewalks on centers.	Skew.	Perishable parts renewed.
......	Wood	$49\frac{6\frac{1}{2}}{12}$	1	$11\frac{11}{12}$	....	......	....	.....
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	.....
......	Wood	$49\frac{11\frac{1}{2}}{12}$	1	$13\frac{6}{12}$	....	......	....	1870
......	Wood	$40\frac{4}{12}$	1	$11\frac{6}{12}$	....	......	....	.....
......	.....	......	....	......	....	......	....	.....
......	Wood	$49\frac{4}{12}$	1	$11\frac{11}{12}$	....	......	....	1886
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	1886
......	Wood	$49\frac{11}{12}$	1	$13\frac{6}{12}$	....	......	....	.....
......	.....	......	....	......	....	......	......	.....
......	Wood	$52\frac{5}{12}$	1	$14\frac{10}{12}$	....	......	....	1885
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	....
......	.....	......	....	......	....	......	....	.....
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	1887
......	.....	......	....	......	....	......	....	1861
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	1884
								1882
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	1861
......	.....	......	....	......	....	......	....	1890
......	.....	......	....	......	....	......	....	1880
......	.....	......	....	......	....	......	....	1886
....	Iron plate girder	.....	1	18	2	5	....	1890

SUMMARY.

ERIE CANAL.

	Miles.
Total length of Erie canal on middle division	$97\frac{2}{100}$
Navigable feeders	$3\frac{54}{100}$
Total	$100\frac{56}{100}$

	Feet.
Ascending lockages, eastward	$44\frac{70}{100}$
Ascending lockages, westward	$10\frac{872}{1000}$
Surface of Frankfort level, above tide-water	$425..\frac{4}{10}$
Surface of Montezuma level, above tide-water	$392\frac{571}{1000}$

The structures are:

Main Line.

Twelve aqueducts (aggregating sixty-seven spans).

Ninety-nine street and road bridges, classified as follows:

Three wrought-iron lift-bridges, one roadway, two sidewalks.

One wrought-iron swing-bridge, one roadway, two sidewalks.

One wrought-iron trapezoidal (Simms), iron needle-beams, two roadways, two sidewalks.

One wrought-iron arch, iron needle-beams, two roadways, two sidewalks.

Three cast-iron arches, iron needle-beams, two roadways, two sidewalks.

One cast-iron arch, wooden needle-beams, two roadways, two sidewalks.

One Bollman truss, wooden needle-beams, two roadways, no sidewalks.

One wrought-iron trapezoidal, iron needle-beams, one roadway, two sidewalks.

Eighteen cast-iron arch, iron needle-beams, one roadway, two sidewalks.

Six cast-iron arch, wooden needle-beams, one roadway, two sidewalks.

One cast-iron suspended arch, wooden needle-beams, one roadway, two sidewalks.

One Bollman truss, wooden needle-beams, one roadway, two sidewalks.

Two cast-iron arch, iron needle-beams, one roadway, one sidewalk.

One cast-iron arch, wooden needle-beams, one roadway, one sidewalk.

One wrought-iron arch, iron needle-beams, one roadway, no sidewalk.

Seventeen cast-iron arch, iron needle-beams, one roadway, no sidewalk.

One wrought-iron swing-bridge, one roadway, no sidewalk.

One wrought-iron trapezoidal, iron needle-beams, one roadway, no sidewalk.

One tubular cast-iron arch, one roadway, no sidewalk.

Three cast-iron arch, wooden needle-beams, one roadway, no sidewalks.

One wooden trapezoidal, wooden chord, two roadways, no sidewalks.

Twenty-two wooden trapezoidal, wooden chord, one roadway, no sidewalks.

Eleven wooden trapezoidal, iron chords, one roadway, no sidewalks.

Three wooden trapezoidal, road and change-bridges, wooden chords one roadway, no sidewalks.

One stone arch, one roadway, one sidewalk.

Seventeen farm bridges, classified as follows:

Five wooden trapezoidal, iron chords, one roadway, no sidewalks.

Twelve wooden trapezoidal, wooden chords, one roadway, no sidewalks.

Two change-bridges classified as follows:

One tubular trapezoidal, iron needle-beams, one roadway, no sidewalks.

One wooden trapezoidal, wooden chord, one roadway, no sidewalks.

Eight tow-path bridges classified as follows:

One wooden swing.

Two cast-iron trapezoidal.

One cast-iron arch, tubular.

Four stringer.

Seven foot-bridges, classified as follows:

One wrought-iron plate girder, iron needle-beams, one walk.

Three wrought-iron trapezoidal, iron needle-beams, one walk.

Two cast-iron trapezoidal, iron needle-beams, one walk.

One wooden trapezoidal, iron chord, wooden needle-beams, one walk.

Two cast-iron arch bridges, carrying salt mains, iron needle-beams.

Eighteen railroad bridges, classified as follows:

Two wrought-iron plate girder swing-bridges, one track.

Two wrought-iron riveted swing-bridges, one track.

Five wrought-iron riveted over bridge, two tracks.

Three wrought-iron pin-connected over bridges, two tracks.

Three wrought-iron pin-connected over bridges, one track.

Three wrought-iron riveted over bridges, one track.

One private farm bridge, wooden trapezoidal, iron chords, one roadway.

Ten private foot bridges, classified as follows:

Three wrought-iron trapezoidal, iron needle-beams, one walk.

Two wooden trapezoidal, wooden chords, one walk.

Five suspension, wooden needle-beams, one walk.

One private wrought-iron, trapezoidal, iron needle-beams, carrying Syracuse Steam Heat and Power Company's pipes.

One cast-iron arch, carrying Solway Process Company's salt mains.

Three bulkheads, waste-weirs and spillways.

Eight bulkheads and waste-weirs.

Seventy-eight culverts, classified as follows:

Thirty-five arch.

Forty-one composite.

Two box.

Seven lift-locks.

One weigh-lock.

Two weigh-locks and office buildings.

Two receivers.

One stop-gate and bulkhead, tumble-gate, stone abutments.

One weigh-lock sewer, stone.

Four city sewers, cast pipe.

Two stone spillways.

One railroad tunnel, two arches.

Feeders and reservoirs.

Nineteen artificial feeders (three navigable).

Ten natural feeders.

One aqueduct.

Thirty-four road and street bridges.

Twenty-four farm bridges.

One tow-path bridge.

One railroad bridge.

Twenty-four bulkheads.

Eight culverts.

Twenty-two river and creek dams.

Eleven reservoir dams.

Four guard-gates.

Ten stone overfalls.

One iron pipe.

One receiver.

Three spillways.

Eight well-houses.

OSWEGO CANAL.

	Miles.
Length of main line	$37\frac{78}{100}$
Side-cuts	$2\frac{86}{100}$
River improvements	$37\frac{58}{100}$
Total	$78\frac{22}{100}$

	Feet.
Ascending lockages, southward, main line (approximate)	$154\frac{528}{1000}$
Ascending lockages, eastward, Oneida river improvement	6
Ascending lockages, westward, Baldwinsville side-cut	10

	Feet+T. W
Surface of Syracuse level	$400\frac{696}{1000}$
Surface, Lake Ontario (approximate)	243
Surface, Seneca river at Three Rivers (approximate)	358
Surface, Oneida lake (approximate)	365
Surface, Seneca river at Cold Spring (approximate)	$358\frac{516}{1000}$
Surface, Seneca river above Baldwinsville dam (approximate)	370

The structures are:

Main Line.

One aqueduct.

Twenty-three street and road bridges, classified as follows:

- One wrought-iron lift-bridge, one roadway, two sidewalks.
- Two cast-iron arch, iron needle-beams, two roadways, two sidewalks.
- Seven cast-iron arch, one roadway, two sidewalks.
- One cast-iron trapezoidal, one roadway, two sidewalks.
- One cast-iron arch, one roadway, one sidewalk.
- Three cast-iron arch, one roadway, no sidewalks.
- One wooden trapezoidal iron-chord, two roadways, no sidewalks.
- Five wooden trapezoidal, iron-chord, one roadway, no sidewalks.
- Three wooden trapezoidal, wooden chord, one roadway, no sidewalks.

Four road and change-bridges, classified as follows:

- One cast-iron tubular arch, iron needle-beams, one roadway, no sidewalks.
- One wooden trapezoidal, two roadways, no sidewalks.
- One cast-iron arch, iron needle-beams, two roadways, no sidewalks.
- One wooden trapezoidal, wooden chords, three roadways, no sidewalks.
- One towpath and road bridge, six spans, wooden chords, one roadway, no sidewalks.

Six change bridges, classified as follows:
  One cast-iron trapezoidal, one roadway.
  One wooden trapezoidal, iron chord, one roadway.
  Four wooden trapezoidal, wooden chord, one roadway.
One wrought-iron plate girder foot-bridge, one walk.
One wooden trapezoidal, carrying salt mains, one track.
One towpath stringer, one roadway.
Two private wrought-iron arch road bridges, one roadway.
Three private foot-bridges, classified as follows:
  One trapezoidal, wrought-iron, one walk.
  Two trapezoidal, wooden, one walk.
Five railroad bridges, classified as follows:
  One wrought-iron lift, two tracks.
  One wrought-iron lattice, two tracks.
  One wrought-iron plate girder swing, one track.
  One wrought-iron pin connected (over), one track.
Eleven bulkheads.
Six culverts, classified as follows:
  One arch.
  Five composite.
Seven stone dams.
Seventeen lift-locks.
Six guard-locks (one used only as a stop gate).
One connecting lock at Fulton.
One weigh-lock (not used).
Three sluices, stone abutments.
Forty-nine sluices, wooden abutments.
Nine spillways.
Three State shops.
Three river walls.
One inlet to salt works

Salina and Liverpool side-cuts.

Eight street bridges, classified as follows:
  One cast-iron arch, iron needle-beams, one roadway, no sidewalks.
  One cast-iron trapezoidal, one roadway, no sidewalks.
  Four wooden trapezoidal, wooden chords, one roadway, no sidewalks.
  Two stringer, one roadway, no sidewalks.
One wooden swing-bridge at Salt Blocks, Liverpool, one roadway, no sidewalks.
One stone lock.
One waste-weir.

Onondaga outlet, Seneca river towing-path, side-cut and Jack's reefs.

Six street bridges, classified as follows:

- One wrought-iron, arch, iron needle-beams, one roadway, two sidewalks.
- Two cast-iron, arch, one roadway, no sidewalks.
- Three wooden swings, one roadway, no sidewalks.

One float bridge (towing-path), one roadway.

One wooden railroad swing-bridge, one track, one sidewalk.

One crib dam.

One guard-gate, stone abutments.

One wooden lock.

Oneida river improvement.

Three road bridges, classified as follows:

- One iron swing.
- Two wooden swings.

One wooden Howe-truss railroad bridge.

One swing railroad bridge.

One crib dam.

One tree dam.

Two steamboat locks.

CAYUGA AND SENECA CANAL.

	Miles.
Length of main line	$20\frac{88}{100}$
Length of Cayuga branch	$2\frac{11}{100}$
Length of Ithaca inlet	$2\frac{5}{100}$
Length of Seneca lake outlet	$0\frac{17}{100}$
Total	$25\frac{21}{100}$

	Feet.
Ascending lockages westward, main line	$63\frac{58}{100}$
Ascending lockages eastward, main line	13
Ascending lockages eastward, Cayuga branch	10

	Feet + T. W.
Surface of Montezuma level	$392\frac{571}{1000}$
Surface of Cayuga lake	$379\frac{571}{1000}$
Surface of Seneca lake (approximate)	445

The structures are, including branches, etc., eighteen street and road bridges, classified as follows:

- Three cast-iron arch, iron needle-beams, two roadways, two sidewalks.

  - One cast-iron arch, iron needle-beams, two roadways, no sidewalks.
  - One wrought-iron trapezoidal, iron needle-beams, one roadway, two sidewalks.
  - Six cast-iron arch, iron needle-beams, one roadway, no sidewalks.
  - One wooden swing, Cayuga, one roadway, no sidewalks.
  - Four wooden trapezoidal, wooden chords, one roadway, no sidewalks
  - Three iron swing, Ithaca inlet, one roadway, two sidewalks.
- Two road and change-bridges, classified as follows:
  - One cast-iron arch, iron needle-beams, two roadways, no sidewalks.
  - One wooden trapezoidal, change-bridge, wooden chords, one roadway, no sidewalks.
  - One wooden trapezoidal farm bridge, wooden chords, one roadway, no sidewalks.
  - One cast-iron trapezoidal, tubular, one roadway, no sidewalks.
- Fourteen tow-path bridges, classified as follows:
  - One wooden draw-bridge, one roadway.
  - Five wooden trapezoidal (aggregating twenty spans), one roadway
  - Two wooden pile bents (aggregating twenty-six spans), one roadway.
  - Six stringer (aggregating eight spans), one roadway.
- Four railroad bridges, classified as follows:
  - One wrought-iron lift, one track.
  - One wrought-iron lattice, over, one track.
  - One wooden, Howe-truss, over, one track.
  - One wrought-iron pin connected, over, one track.
- One private trussed, carrier bridge, wood.
- Nine culverts, composite.
- Four dams, classified as follows:
  - Two stone.
  - One crib.
  - One rip-rap.
- Eleven lift-locks.
- Twenty-one wooden sluices.
- Three spillways.
- One waste-weir.
- Four piers.
- Two breakwaters.
- Two light-houses.

CHEMUNG CANAL.

Lake level, $2\frac{53}{100}$ miles long.

The structures are:

One wrought-iron plate girder swing-bridge, one roadway, two sidewalks.

One cast-iron arch-bridge (old canal), one roadway, two sidewalks.

One pier.

Three breakwaters, Watkins Harbor.

BLACK RIVER CANAL.

	Miles.
Length Rome to Lyons Falls	$35\frac{52}{100}$
Length river improvement	$42\frac{50}{100}$
Length navigable feeders	$12\frac{69}{100}$
Total	$90\frac{71}{100}$

	Feet.
Ascending lockages (canal) northward	693
Ascending lockages (canal) southward	$387\frac{25}{100}$
Ascending lockages (river) southward (approximate)	9

	Feet + T. W.
Surface of Rome level	$428\frac{4}{10}$
Surface of Summit level	$1,121\frac{4}{10}$
Surface of river at Lyons Falls	$734\frac{15}{100}$
Surface of river at Carthage (approximate)	722

The structures are (main canal):

Six aqueducts, aggregating twenty-four spans.

Thirty-seven street and road bridges, classified as follows:

One cast-iron arch, iron needle-beams, two roadways, two sidewalks.

Three cast-iron arch, iron needle-beams. one roadway, two sidewalks.

One wrought-iron trapezoidal, iron needle-beams, one roadway, two sidewalks

Three cast-iron arch, wooden needle-beams, one roadway, two sidewalks.

One cast-iron arch, iron needle-beams, one roadway, one sidewalk.

One cast-iron arch, wooden needle-beams, one roadway, one sidewalk.

Four cast-iron arch, iron needle-beams, one roadway, no sidewalks.

One cast-iron tubular wooden arch needle-beams, one roadway, no sidewalk.

One wooden trapezoidal, iron chord, one roadway, one sidewalk.

Two wooden trapezoidal, iron chord, one roadway, no sidewalks.

Nine wooden trapezoidal, wooden chord, one roadway, no sidewalks.

Two wooden trapezoidal road and change-bridges, wooden chords, one roadway, no sidewalks.

One cast-iron arch road and change-bridge, wooden needle-beams, one roadway, no sidewalk.

Thirty farm bridges, classified as follows :
  Three wooden trapezoidal, iron chords, one roadway.
  Twenty-seven wooden trapezoidal, wooden chords, one roadway.
One wooden trapezoidal change-bridge, wooden chords, one roadway.
One tubular cast-iron arch tow path bridge, one roadway.
Two stringer tow path bridge, one roadway.
One railroad swing-bridge, one track.
One railroad truss-bridge, over, one track.
One private farm bridge, wooden trapezoidal, iron chord, one roadway.
Five bulkheads and waste-weirs.
Three spillways.
Eleven culverts, classified as follows:
  Eight arch.
  One composite
  Two box.
Two dams, wooden, with stone abutments.
One hundred and nine locks.
One stone sluice.

BLACK RIVER IMPROVEMENT.

One bridge across Mohawk river at Delta, two spans.
Five river bridges, with a swing span in each (aggregating four iron and thirteen wooden spans), one roadway, each.
One wrought-iron river bridge, seven spans, one roadway, one sidewalk.
One wooden road bridge (Beaver river), two spans, one roadway.
Three bridges at junction of Black and Noose rivers, wood, five spans.
One railroad bridge.
Two wooden steamboat locks.
Three dams.

Delta feeder.

One wooden truss road bridge.
One stringer road bridge.
One wooden truss farm bridge.
One stringer farm bridge.
One wooden dam.
One guard-lock.

Lansingkill feeder.

Three wooden bridges, stringer.
One bulkhead.

Forestport feeder.

One cast-iron arch road bridge, one roadway.
Ten wooden trapezoidal road bridges, one roadway.

Two wooden trapezoidal farm bridges, one roadway.
Three bulkheads.
One bulkhead and spillway.
Three culverts.
One dam.
One guard-lock.

Sugar river feeder.

One bulkhead.
One dam.

Reservoirs for Forestport feeder.

Seven bulkheads and waste-weirs.
Nine dams.
Two tenders' houses.
Three well-houses.
One waste-weir.

Black river and Beaver river reservoirs.

Three bulkheads.
Three dams.

TABLE No. 5.

MIDDLE DIVISION — ERIE CANAL.

List of benches, showing elevation above canal bottom and above tide water.

NOTE — Benches are marked by a copper plug, flush with the top of stone, except as otherwise noted.

Number.	DESCRIPTION.	Elevation above C. B.	Elevation above T. W.
	FRANKFORT LEVEL — ELEVATION OF C. B. 418.400 + T. W.		
1	Green's road bridge, East Utica, southeast corner, lower step, east wing tow-path abutment	13.638	432.038
2	Starch factory bridge, southwest corner of bridge, east tow-path abutment (not marked)	17.063	435.463
3	Clay street bridge, Utica, northwest corner, west wing tow path abutment, on stone under sloping coping	12.393	430.793
4	Ballou waste-weir, west end of bulkhead wall	8.495	426.895
5	Utica weigh-lock, northwest corner, top of base of fourth column from east end (not marked)	11.156	429.556
6	Genesee street bridge, Utica, second step, east wing tow-path abutment	10.820	429.220
7	Seneca street bridge, Utica, lower step, west wing tow-path abutment	11.986	430.386
8	Broadway foot bridge, Utica, southwest corner of stone at foot of west stairs, tow-path side	9.274	427.674
9	White boro street bridge, Utica, fourth step, west wing tow-path abutment	13.148	431.548
10	Lock No. 46, northeast hollow quoin, tow-path lock (between anchors) lift of lock No. 46, three feet westward	12.038	430.438
	ROME LEVEL — ELEVATION OF C. B. 421.400 + T. W.		
11	Platt street foot bridge, Utica, lower step, east wing tow-path abutment	11.020	432.420
12	Whitesboro road bridge, lower step, east wing tow-path abutment	11.574	432.974
13	Yorkville road bridge, lower step, east wing tow-path abutment	12.872	434.272

14	Sauquoit aqueduct, second coping stone from end of east wing, parapet wall	12.046	433.446
15	Clinton street bridge, Whitesboro, lower step, west wing tow-path abutment	12.198	433.598
16	Westmoreland street bridge, Whitesboro, lower step, east wing tow-path abutment.	11.242	432.642
17	Bradley road bridge, coping of buttress, east wing tow-path abutment	13.901	436.301
18	Evans farm bridge, lower step, east wing, tow-path abutment	12.528	433.928
19	Oriskany aqueduct, southwest corner, coping of parapet, end of west wing	12.441	433.841
20	Brainard's farm bridge, lower step, west wing tow-path abutment	11.177	432.577
21	Parkhurst's farm bridge, lower step, east wing, tow-path abutment	12.251	433.651
22	Kirley's farm bridge, lower step, west wing, tow-path abutment	13.503	434.903
23	Murphy's road bridge, lower step, east wing, tow-path abutment	13.330	434.730
24	Waste-weir No. 2 (near Clark's farm bridge), east end of parapet coping	11.440	432.840
25	Stanwix road bridge, second step, east wing, tow-path abutment	15.189	436.589
26	Mohawk feeder, Rome, southwest corner, west wing of culvert under towing-path	11.839	433.239
27	Ethridge & Fuller's store (near — west of — James street, Rome,) southeast corner east window sill in rear of store (not marked)	14.853	436.253
28	Barnes' farm bridge, lower step, east wing, tow-path abutment	13.516	434.916
29	Brainard's farm bridge, second step, west wing, tow-path abutment	15.557	436.957
30	Fort Bull waste-weir, near west end coping of parapet wall	11.315	432.715
31	Armstrong's farm bridge, lower step, west wing, tow-path abutment	13.644	435.044
32	Herrig's farm bridge, lower step, east wing, tow-path abutment	13.648	435.048
33	Sands' farm bridge, lower step, east wing, tow-path abutment	14.212	435.612
34	Tuttles, farm bridge, lower step, east wing, tow-path abutment	13.724	435.124
35	Main street bridge, New London, lower step, east wing, tow-path abutment	13.661	435.061
36	Grove Spring road bridge, west stone under berme bent back of front timber.	7.858	429.258
37	Stacy's Basin road bridge, lower step, east wing, tow-path abutment	13.973	435.373
38	Happy Valley road bridge, lower step, east wing, tow-path abutment	13.814	435.214
39	East road bridge, Higginsville, second step, east wing, tow-path abutment	10.155	431.555
40	West road bridge, Higginsville, second step, west wing, tow-path abutment	10.166	431.566
41	Dunbarton road bridge, second step, east wing, tow-path abutment	10.319	431.719
42	Durkee's road bridge, third step, east wing, tow-path abutment	10.970	432.370
43	State road bridge, third step, east wing, tow-path abutment	11.097	432.497

TABLE 5 — MIDDLE DIVISION — ERIE CANAL — *List of benches, etc.*— (Continued.)

Number.	DESCRIPTION.	Elevation above C. B.	Elevation above T W.
44	Culvert No. 34 (one mile west of State bridge), northeast corner, east end of parapet coping	7.073	428.473
45	East road bridge, Durhamville, third step, west wing, tow-path abutment	12.255	433.655
46	Main street bridge, Durhamville, third step, east wing, tow-path abutment	11.152	432.552
47	Bennett's road bridge, Durhamville, lower step, west wing, tow-path abutment	11.611	433.011
48	Shollhammer's road bridge, second step, east wing, berme abutment	12.771	434.171
49	Cowassalon aqueduct, near center of east face of coping of buttress, east wing, tow-path side	8.741	430.141
50	Lenox basin road bridge, second step, west wing, tow-path abutment	10.556	431.956
51	Culvert No. 39 (one mile west of Lenox basin), coping of parapet over face of east wing	6.595	427.995
52	Peterboro street bridge, Canastota, fourth step, east wing, tow-path abutment	12.414	433.814
53	Culvert No. 42 (at cider mill, Canastota), northeast corner coping of parapet	7.700	429.100
54	Beebe's road bridge, fourth step, east wing, tow-path abutment	11.580	432.980
55	Culvert No.43 (one-quarter mile west of Beebe's road), center of coping, tow-path parapet	7 434	428.834
56	Culvert No. 44 (near Fuller's road), coping tow-path parapet	7.429	428.829
57	New Boston road bridge, fourth step, east wing, tow-path abutment	11.944	433.344
58	Canasaraga culvert No. 45, west end, coping of parapet	5.717	427.117
59	Canasaraga road bridge, fourth step, east wing, tow-path abutment	11.996	433.396
60	Chittenango road bridge, third step, east wing, tow-path abutment	11.932	433.332
61	Chittenango aqueduct, stone under coping of parapet, west wing, tow-path side near joint	11.296	432.696
62	Bolivar road bridge, stone under coping of buttress, west wing, tow-path abutment	12.541	433.941
63	White's road bridge, coping buttress, east wing, tow-path abutment	13.783	435.183

64	Pool's brook waste-weir, southeast corner, east end coping of parapet (not marked)	10.451	431.851
65	Pool's brook road bridge, coping buttress, east wing, tow-path abutment	13.470	434.870
66	Kirkville road bridge, coping buttress, west wing, tow-path abutment	14.005	435.405
67	Culvert No. 48 (one-half mile west of Kirkville), northeast corner coping tow-path parapet	4.681	426.081
68	Manlius Center road bridge, coping, east buttress, tow-path abutment	13.039	434.439
69	S. and C. V. R. R. bridge, second step, west wing, tow-path abutment	10.500	431.900
70	Limestone aqueduct, southwest corner parapet coping, west wing, tow-path side	12.710	434.110
71	Burdick's culvert, No. 50, west stone, west wing, tow-path side	1.988	423.388
72	Butternut aqueduct, end stone, east wing, tow-path side	12.491	433.891
73	Thompson's landing road bridge, coping, west buttress, tow-path abutment	12.167	433 567
74	West powder house, southeast corner, stone door sill (not marked)	8.759	430.159
75	Stop-gate (one-half mile east of lock No. 47), west end of coping, tow-path side	8.604	430.004
76	Lock No. 47, southeast, hollow quoin, tow-path lock, lift of lock No. 47, 10.175 feet, eastward	9,184	430.584
	SHORT LEVEL — ELEVATION OF C. B. 411.225+T. W.		
77	Lock No. 48, southeast, hollow quoin, tow-path lock, lift of lock No. 48, 10.538 feet, eastward	8.736	419.961
	MILE LEVEL — ELEVATION OF C. B. 400.687+T. W.		
78	William street bridge, Syracuse, third step, east wing, tow-path abutment	12.014	412.701
79	Lock No. 49, southeast, hollow quoin, tow-path lock, lift of lock No. 49, 6.991 feet, eastward	8.913	409.600
	SYRACUSE LEVEL—ELEVATION OF C. B. 393.696+T. W.		
80	Weigh-lock, Syracuse, northeast, hollow quoin	9.027	402.723
81	West street, Syracuse	11.700	405.396
82	Geddes street, Syracuse, fourth step, east wing, tow-path abutment	11.649	405.345
83	West Genesee street, Syracuse, coping buttress, west wing, tow-path abutment	13.129	406.826
84	Bridge street, Syracuse, coping buttress, west wing, tow-path abutment	13.591	407.287

TABLE No. 5 — MIDDLE DIVISION — ERIE CANAL — *List of benches, etc.* — (Continued).

Number.	DESCRIPTION.	Elevation above C. B.	Elevation above T. W.
	SYRACUSE LEVEL — (Continued).		
85	Discharge well, near Salt company's bridge, southwest corner, stone coping........	10.047	403.743
86	Gere's Landing road bridge, coping buttress, west wing, tow-path abutment.......	13.481	407.177
87	Lock No. 50, southeast, hollow quoin, towpath lock, between anchors, lift of lock No. 50, 7,872 feet, westward..	16.761	410.458
	JORDAN LEVEL — ELEVATION OF C. B. 401,568+T. W.		
88	Culvert No. 57 (one-half mile west of lock No. 50), coping parapet, east end, tow-path side..	3.110	404.678
89	Belle Isle road-bridge, coping buttress, east wing, tow-path abutment............	13.564	415.132
90	Amboy road bridge, coping buttress, east wing, tow-path abutment...............	13.802	415.370
91	Camillus aqueduct, northeast corner, east wing, coping parapet, tow-path side......	12.475	414.043
92	Camillus road and change-bridge, coping buttress, east wing, tow-path abutment...	12.708	414.276
93	Newport road bridge, coping buttress, east wing, tow-path abutment.............	12.358	413.926
94	Memphis road bridge, coping buttress, east wing, tow-path abutment	14.231	415.799
95	Culvert No. 60 (three-fourths of a mile west of Memphis) northeast corner coping of buttress, west tow-path wing	4.486	406.054
96	Peru road bridge, coping buttress, west wing, tow-pathabutment.................	12.342	413.910
97	Shanty Point farm bridge, coping buttress, east wing, towpath abutment..........	12.576	414.144
98	Culvert No. 62 (three-eighths of a mile east of Jordan) coping tow-path parapet near center	4.874	406.442
99	Beaver street bridge, Jordan, coping buttress, east wing, tow-path abutment.......	13.206	414.774
100	Jordan aqueduct, coping parapet, east wing, tow-path side	12.558	414.126
101	Lock No. 51, southeast hollow quoin, tow-path lock, between anchors, lift lock No. 51, 5.580 feet eastward...	8.943	410.511

	PORT BYRON LEVEL, ELEVATION OF C. B. 395.988+T. W.		
102	Cold Spring road bridge, third step, west wing, tow-path abutment	10.664	406.652
103	Fountainville road bridge, fourth step, east wing, tow-path abutment	12.012	408.000
104	Field's road bridge, second step, east wing, tow-path abutment	10.036	406.024
105	Putnam's farm bridge, third step, east wing, tow-path abutment	11.678	407.666
106	Young's farm bridge, second step, east wing, tow-path abutment	11.075	407.063
107	Weedsport waste-weir, east end, east wall of bulkhead	8.768	404.756
108	Seneca street bridge, Weedsport, third step, east wing, tow path abutment	10.918	406.906
109	Brutus street bridge, Weedsport, third step, east wing, tow-path abutment	11.935	407.923
110	Centerport aqueduct, coping east buttress, west wing, tow-path side	8.605	404.593
111	Centerport road bridge, fifth step, east wing, tow-path abutment	13.243	409.231
112	Utica street bridge, Port Byron, fifth step, east wing, tow-path abutment	12.461	408.449
113	Port Byron aqueduct, coping north buttress, east wing, tow-path side	8.539	404.527
114	Lock No. 52, southeast hollow quoin, tow-path lock, lift of lock No. 52, 11.417 feet, eastward	8.442	404.430
	MONTEZUMA LEVEL, ELEVATION OF C. B. 384.571+T. W.		
115	Houghtaling road bridge, third step, east wing, tow-path abutment	10.939	395.510
116	Crane Brook aqueduct, coping parapet, end of west wing, tow-path side	12.570	397.141
117	Salt street bridge, Montezuma, fourth step, west wing, tow-path abutment	12.636	397.207
118	Clark street bridge, Montezuma, third step, west wing, tow-path abutment	12.095	396.666
119	Seneca river aqueduct, northest corner, coping parapet, east wing, north buttress	12.393	396.964
120	Seneca river aqueduct, coping parapet, west wing, north buttress	12.254	396.825
121	May's Point road and change-bridge, third step, west wing, south abutment	12.164	396.735
122	Culvert No. 80 (one and one-fourth mile west of May's Point), southwest corner coping of tow-path parapet	5.334	390.905
W. Div.	Road bridge, Wayne county line, coping buttress, east wing, tow-path abutment	12.407	396.978

TABLE 5 — (*Continued*) — CAYUGA AND SENECA CANAL.

Number.	DESCRIPTION.	Elevated above C. B.	Elevated above T. W.
	MONTEZUMA LEVEL No. 11, ELEVATION OF C. B. 384.571+T. W.		
1	Lock No. 11, southeast (lower berme) hollow-quoin (between anchors) (Lift of lock No. 11, 1.194 eastward.)	8.921	393.492
	CAYUGA LEVEL No. 11, ELEVATION OF C. B. 381.377+T. W.		
1	Lock No. 11, southeast (lower berme) hollow-quoin (between anchors)	12.115	393.492
2	Ransom's road bridge, fourth step, south wing, tow-path abutment	12.045	393.422
3	Stahlnecker's farm bridge, bottom step, south wing, tow-path abutment	10.369	391.746
4	Free bridge, third step, south wing, tow-path abutment on hole in stone bolt gone	11.769	393.146
5	Lock No. 9, northwest (lower tow-path) hollow-quoin (between anchors) (Lift of lock No. 9, 9.799 eastward.)	9.113	390.490
	RIVER LEVEL No. 9 (*crossing Cayuga Lake outlet*), ELEVATION OF C. B. 371.578+T. W.		
5	Lock No. 9, northwest (lower tow-path) hollow-quoin (between anchors)	18.912	390.490
6	Lock No. 8, northwest (upper tow-path) hollow-quoin (between anchors) (Lift of lock No. 8, 6.481 westward.)	14.451	386.029
	LEVEL No. 8, ELEVATION OF C. B. 378.059+T. W.		
6	Lock No. 8, northwest (upper tow-path) hollow-quoin (between anchors)	7.970	386.029
7	Demont's road bridge, third step, west wing, tow-path abutment	12.116	390.175
8	Lock No. 7, northwest (upper tow-path) hollow-quoin (between anchors) (Lift of lock No. 7, 5.477 westward.)	14.810	392.869

	LEVEL NO. 7, ELEVATION OF C. B. 383.536+T. W.		
8	Lock No. 7, northwest (upper tow-path) hollow-quoin (between anchors)	9.333	392.869
9	Lock No. 6, northwest (upper tow-path) hollow-quoin (between anchors)	18.828	402.364
	(Lift of lock No. 6, 10.189 westward.)		
	LEVEL NO. 6, ELEVATION OF C. B. 393.725+T. W.		
9	Lock No. 6, northwest (upper tow-path) hollow-quoin (between anchors)	8.639	402.364
10	Lock No. 5, southwest (upper tow-path) hollow-quoin (between anchors), one and one-half feet from heel post, not marked	17.616	411.341
	(Lift of lock No. 5, 8.430 westward.)		
	LEVEL NO. 5, ELEVATION OF C. B. 402.155+T. W.		
10	Lock No. 5, southwest (upper tow-path) hollow-quoin (between anchors) one and one-half feet from heel post, not marked	9.186	411.341
11	Lock No. 4, southwest (upper tow-path) hollow-quoin (between anchors) one and one-half feet from heel post, not marked	18.649	420.804
	(Lift of lock No. 4, 9.288 westward.)		
	LEVEL NO. 4, ELEVATION OF C. B. 411.443+T. W.		
11	Lock No. 4, southwest (upper tow-path) hollow-quoin (between anchors) one and one-half feet from heel post, not marked	9.361	420.804
12	Lock No. 3, first recess stone above northwest upper berme, hollow-quoin	20.886	432.329
	(Lift of lock No. 3, 9.763 westward.)		
	LEVEL NO. 3, ELEVATION OF C. B. 421.206+T. W.		
12	Lock No. 3, first recess stone above northwest (upper berme) hollow-quoin........	11.123	432.329
13	Sackett's creek bridge, northeast corner, top step, north wing, west abutment, not marked	10.295	431.501
14	Kingdom road bridge, second step, east wing, tow-path abutment................	13.096	434.302
15	Lock No. 2, southeast (lower tow-path) hollow-quoin (between anchors).	15.362	436.568
	(Lift of lock No. 2, 6.904 westward.)		

TABLE 5 — CAYUGA AND SENECA CANAL — (*Concluded*).

Number.	DESCRIPTION.	Elevated above C. B.	Elevated above T. W.
	LEVEL NO. 2, ELEVATION OF C. B. 428.110+T. W.		
15	Lock No. 2, southeast (lower tow-path) hollow-quoin (between anchors)	8.458	436.568
16	Lock No. 1, southeast (lower tow-path) hollow-quoin (between anchors)	18.292	446.402
	(Lift of lock No. 1, 7.402 westward.)		
	LEVEL NO. 1, ELEVATION OF C. B. 435.513+T. W.		
16	Lock No. 1, southeast (lower towpath) hollow-quoin (between anchors)	10.889	446.402
17	Locust street bridge, Waterloo, southeast corner, lower step, west wing, north abutment, not marked	11.694	447.207
18	Geneva, Ithaca and Sayre railroad bridge, southwest corner, lower step, west wing, tow-path abutment, not marked	14.899	450.412
19	Teal's road bridge, coping east buttress, tow-path abutment	14.616	450.129
20	Pre-emption road bridge, second step, west wing, tow-path abutment	16.127	451.640
21	Evans street bridge, Geneva, east buttress, tow-path abutment	15.766	451.279
22	Lake street bridge, Geneva, second step, east wing, tow-path abutment, not marked,	15.647	451.160
	CAYUGA BRANCH LEVEL NO. 10, ELEVATION OF C. B. 381.377+T. W.		
23	Lock No. 10, southwest (lower tow-path) hollow-quoin (between anchors)	9.403	390.780
	(Lift of lock No. 10, 9.709 northward.)		
	SENECA RIVER, BETWEEN CAYUGA LAKE AND CROSS LAKE.		
1	Lock No. 10 (Cayuga and Seneca canal) between anchors, lower tow-path, hollow-quoin, marked □ with chisel	0.008	390.813
2	Lock No. 9 (Cayuga and Seneca canal) between anchors, lower berme, hollow-quoin, marked ⊡ with chisel	0.234	390.587

3	Seneca river aqueduct, coping on parapet northeast corner of projection over fifteenth pier from east end, marked □ with chisel	6.049	396.870
3½	Center of grey limestone monument on rear slope of towpath five feet from rear angle, about 2,000 feet west of Seneca river aqueduct, at old crossing of Canandaigua river, not marked	2.226	388.595
4	West Shore railroad bridge, southeast corner of coping, tenth pier from east end, marked □ with chisel	4.799	386.022
5	New York Central and Hudson River railroad bridge, coping forty-ninth pier from east end, south track, marked □ with chisel	4.687	386.134
6	Center of grey limestone monument, east side of highway, fifty-four and three-tenth feet northerly from northeast corner and in line with east side of Mosquito Point bridge, not marked	0.336	390.485
7	Iron road bridge over Seneca river one mile west of Cross lake, west corner of stone under south end of west truss, sixty-five-one hundredth foot from side and two and one-tenth feet from end of truss casting, marked □ with chisel	6.059	384.762

REPORT

OF THE

DIVISION ENGINEER

OF THE

WESTERN DIVISION

FOR THE

YEAR ENDING SEPTEMBER 30, 1892.

WESTERN DIVISION.

ROCHESTER, *November* 5, 1892.

Hon. MARTIN SCHENCK, *State Engineer and Surveyor* :

Sir.— I have the honor of submitting to you my report on the western division of the State canals, for the fiscal year ending September 30, 1892:

The canal, slips and navigable feeders are as follows:

	Miles.
Erie canal, from the east line of Wayne county to Hamburgh street, in the city of Buffalo	148.92
Five slips in the city of Buffalo, aggregate length	1.60
Genesee river feeder, in the city of Rochester	2.25
Total miles	152.77

Unnavigable feeders.

	Miles.
Tonawanda and Oak Orchard creek	11.55
Genesee Valley canal, from Cuba reservoir to lock 87, Rockville	7.65
Genesee Valley canal, from Scottsville to Rochester rapids dam	11.00
Total miles	30.20

The sources of water supply for the Erie canal are as follows:

1. Lake Erie, at Buffalo.

2. Tonawanda creek, at Pendleton.

3. Tonawanda and Oak Orchard creek, at Medina.

4. Allen's creek, through the Genesee Valley canal and Genesee river feeder, from Scottsville to Rochester; this water is connected from Valley canal by a pipe across river to the feeder below the rapids dam, and thence into canal.

5. The Cuba reservoir, in Allegany county, through the Genesee Valley canal and the Genesee river to Rochester, and through the Genesee river feeder, in the city of Rochester, into the canal.

The Tonawanda and Oak Orchard feeder and the Genesee river assist in filling the canal in the spring; the water from Allen's creek, at Scottsville, which is taken into the feeder at Rochester, tends to keep the water in the feed pure through the summer months.

Since care has been taken to use as little water as possible below Newark, in locking boats, no difficulty has been experienced in keeping up the levels at the lower end of the division.

Dams.

There are six dams on the division, as follows:

First. One across Tonawanda creek, near its mouth; it raises the water in the creek about four feet above the level of Niagara river.

Second. One across the same creek, south of Medina; its purpose is to turn the water of the creek into the feeder, and through it into the channel of Oak Orchard creek, and from thence into the canal at Medina.

Third. One across Allen's creek, in the village of Scottsville, to send the water through the Genesee Valley canal, which is now used as a feeder from Scottsville to Rochester.

Fourth. One across the Genesee river at Rochester, to turn the water of that stream into the feeder.

Fifth. One across Oil creek, near the village of Cuba, Allegany county, to hold the water of that creek and form a reservoir; it is composed of earth, faced with rip-rap and slope wall, and is 2,200 feet long and sixty-five feet in height where it crosses the stream.

Sixth. One across a valley, two miles from the last-mentioned one; it has a waste-weir, composed of stone, to serve as an escape for the water of the creek when the reservoir is full.

Locks

There are twenty-three locks on this division and all lock down toward tide-water.

No.	*Location.*	Lift in feet.
53.	One and one-fourth miles west of Clyde (length'd),	4.755
54.	At Lock Berlin (lengthened)	7.360
55.	In the village of Lyons (lengthened)	6.251
56.	Poor-house, one and seven-tenths miles west of Lyons (lengthened)	9.848
57.	Lower lock at Lockville, near Newark (not lengthened)	8.028
58.	Middle lock at Lockville, near Newark (not lengthened)	8.004
59.	Upper lock at Lockville, near Newark (not lengthened)	8.002
60.	Eight-tenths of a mile east of Macedon (length'd)..	9.886
61.	In the village of Macedon (lengthened)	6.601
62.	Two and one-quarter miles west of Pittsford (lengthened)	8.807
63.	Miller's, in the village of Brighton (lengthened) ...	8.719
64.	Sipple's, in the village of Brighton (lengthened) ..	10.108
65.	Reservoir, in the city of Rochester (lengthened)...	10.102
66.	First lock in the city of Rochester (lengthened) ...	8.859
67-71.	Five combined locks at Lockport (not length'd)..	57.427
	One guard-lock at Sulphur Springs, it has one chamber 110 x 20 feet and two additional head-gates. These gates are closed when a flood occurs in Tonawanda creek, otherwise they are left open.	
	One river lock at Tonawanda, connecting the Niagara river with canal, the lift is generally four feet, depending on height of water in river.	
	One double-chamber guard and lift-lock (length'd) at Black Rock (No. 72); it is 112 x 20 feet. The lift together with the fall in the harbor from the canal below the mean low water in the lake is..	2.425
	Total lift	175.182

By adding to the above lifts the surface descent on the different levels we get the total descent on the division.

On Montezuma level	.196	
On twelve-mile level, No. 59 to 60	.165	
On seventeen-mile level, No. 61 to 62	.343	
On three-mile level, No. 62 to 63	.063	
On long level, Rochester to Lockport, No. 66 to 67,	3.165	
On level between Lockport and Black Rock	1.239	
		5.171
Total rise going west		180.353

There is also one single-chamber ship-lock from Black Rock harbor to the Niagara river, it is 200 x 36 feet. The lift is usually four feet, according to the height of water in the lake and river. The weigh-lock in the city of Rochester, not used as such for some years.

Repairs to locks.

New gates inserted in locks 59 and 57, with ordinary repairs to planking foundation.

Balance-beams renewed on 53, 54, 55 and 59; upper gates replanked where necessary.

New paddles inserted in towpath gates No. 62 — gates repaired and masonry repointed and grouted where necessary.

New platform for tumble-gate No. 63 and 64, gates repaired, bottom of chamber grouted, replanked and masonry repainted.

Upper gates No. 65 partly replanked.

Gates repaired in No. 66. New gates in north and south lock 67.

New gates inserted south side lock 69 and north side lock 71; four balance-beams renewed.

The miter-sills in combined locks 67 to 71, originally stone, are badly broken and ought to be replaced.

Repairs to locks needed.

One set new lower towpath gates, new miter-sill and lining bottom, Nos. 53, 55 and 56.

One new tumble-gate platform and four new paddles, towpath lock No. 54.

There is considerable trouble in lock No. 57. During the season a leak occurs under foundation, through lock and into culvert. It will be necessary to remove plank in foundation and fill up with grout to stop it.

The south wall at No. 71 requires to be taken down and rebuilt. It is pushing out of line by the action of frost and water from State race running through the joints. This was recommended last year.

The river-lock at Tonawanda, new balance-beams and other repairs.

The ship-lock at Black Rock, needs considerable repairs. The two upper courses of stone, which have been crushed and knocked out of place by Tonawanda barges, should be replaced. The necessary stone has been cut for this work.

Aqueducts.

The Palmyra aqueduct has had the sides of trunk replanked and the masonry pointed and grouted where required.

The Rochester aqueduct leaks considerably and requires the bottom cemented and sides repointed. Recommended in last report.

The Medina aqueduct leaks very badly through arch and wings. The arch, full width of prism, should be uncovered, thoroughly cleaned and grouted and pointed. This ought to be attended to before opening of navigation next year.

Bridges.

There are 113 bridges of cast-iron; 52 of wrought-iron; 22 of wood and iron and 36 of wood over Erie canal; slips 1, 2 and 3; Ohio and Commercial slips; Hamburgh and Clark & Skinner canals in the city of Buffalo; and one pipe truss over Oak Orchard creek feeder on Batavia road, Orleans county, making a total of 224. (See table.)

Wooden bridge No. 2, has been examined and the lower chord found unsound; the travel with teams and threshing machines passing over it necessitates a stronger structure.

No. 17, has had approaches improved, new sidewalks and railing.

Nos. 4, 26 and 37, have had new joists and roadway replanked.

No. 42, has been renewed.

No. 52. Two new floor-beams inserted and floor partially replanked.

No. 55. New floor joists and replanked.

No. 59. Replaced by new, of wood and iron, lower chord.

No. 77. The old motors, sixteen inches diameter, for raising lift, was replaced by new of twenty-one inches diameter, thus giving more power. A general overhauling was made on the shafting and gearing. This work is a great improvement and the bridge works satisfactorily.

No. 78. Roadway partly replanked. This bridge (Bollman) is located over canal on Ford street, and is contiguous to Rochester and Pittsburg and Western New York and Philadelphia railroad depots. Very heavy loads were passing over it, which caused a couple of the pins that suspension rods are fastened to to bend and fractured the bottom of the cast-iron vertical posts. They were temporarily repaired and notice given that no loads over five tons should pass over it. I would recommend a wrought-iron truss being built capable of carrying at least eight tons to a panel; this will give great relief to the lift at West avenue, as they now have to go over it instead of Ford.

No. 86. A lift has been substituted in place of Whipple iron arch at Rowe street, in the city of Rochester.

No. 92. Replaced by a new wood truss with iron lower chords, formerly in No. 62.

No. 108. Lift at Brockport; new wheel and worm gear renewed; also hoisting chains.

No. 93. Requires new wood truss; the lower chord iron can be used again.

Nos. 116, 117, 120, 121, 122, 127, 137, 145, 161 and 162. New joists inserted and plank renewed.

No. 167. The wooden bridges (A. and C.) in deep cut used as approaches to it, has been rebuilt.

Wood bridge, Reynale's Basin, No. 149, is 107 8-12 feet clear span; should be renewed, it has a skew of fourteen degrees twenty-four minutes left; would recommend a wrought-iron, to replace it.

The Whipple iron-arch bridge (210) on Scott street, over Clark & Skinner canal, collapsed August 7, 1892, and fell into canal; this was caused, as I am informed, by the driver of a team running the hind wheel of a loaded wagon under the arch; the hub striking the chord, acted as a wedge, breaking the flanges near the end of second panel joining the first. This bridge is now replaced by a temporary one, erected on piles, which will probably maintain traffic for a few years.

Whipple iron-arch bridges Nos. 203, 205, 206, 210, 217, in the city of Buffalo, are not suitable to sustain the heavy traffic, and I consider them unsafe; would recommend that they be replaced by wrought-iron.

No. 174. Wood bridge (Pickard's) over Tonawanda creek is not safe and ought to be renewed.

No. 175 1-2. A new iron lattice bridge, resting on two abutments and two piers (stone) was constructed over the Tonawanda creek and Erie canal, connecting Main street and Delaware avenue, in the village of Tonawanda.

Bridge masonry.

No. 42. The towpath abutment was found unsafe; it was taken down and rebuilt before opening of navigation.

No. 174. The two piers in Tonawanda creek for Pickard's bridge require to be taken down and rebuilt, they are unsafe at present.

No. 178. The abutments to the Whipple iron-arch bridge over river-lock slip at Tonawanda, are leaning over and endangering the structure, they ought to be taken down to water line and rebuilt.

Culverts.

No. 54. Adam's Basin. Wings, parapet and forty-five lineal feet of arches (2) each, south end, has been rebuilt. This culvert broke away on the berme side, July 7, 1888 (south side of canal).

Nos. 58 and 58 1-2. Brockport. The old culverts were too small to take off the drainage and were replaced by new arch of four chord.

No. 96. The arch roadway culvert is very much out of repair. The arch leaks, parapet walls giving way and ready to fall out. The arch should be uncovered, masonry cleaned and grouted, parapet walls taken down and rebuilt.

No. 99. A new culvert has been built under and across canal at Medina, and running north down Rock street to Oak Orchard creek, where it empties; this was necessary on account of the old one being too small to take off the increased drainage.

A great number require repairs to masonry, also nine culverts are filled up, so the water can not pass freely through them (recommended in last report).

Bulkheads and waste-weirs, etc.

Waste-weirs Nos. 1 and 5 requires new aprons and repairs to masonry. The dam at head of Geneva river feeder, Rochester, requires new planking for a distance of 400 lineal feet, running from west side towards bulkhead, as it leaks very much.

The bulkhead at Knowlesville stop-gate, should be renewed, also, the protection cribs to swing-bridge at Albion (No. 128).

Vertical walls.

The wall under bridge No. 16, towpath side, needs relaying a portion having fallen into canal.

About sixty feet west of bridge No. 39, needs taking down and relaying towpath side; also wall under southwest approach to bridge No. 32. Vertical and slope wall above bridge No. 40, and between change 22, and railroad bridges requires to be taken down and relaid.

The walls through the city of Rochester are in poor condition; between Allen and Brown streets, towpath side, a distance of 600 lineal feet, should be taken down and rebuilt; at St. Paul street, about 200 feet should be taken down and rebuilt.

The high retaining wall at east end of aqueduct and west line of St. Paul street is getting in poor condition. It requires considerable repairs to make it secure. Many stones are falling out into canal. Docking and guardrailing, towpath side, extending from head of lock 71, westerly for over 1,200 lineal feet, has been removed.

The walls, towpath side, between Pendleton and Sulphur Springs guard-lock are in poor condition, the stone being small, it ought to be replaced by large stone and laid up by a derrick.

The vertical wall at head of ship-lock, Black Rock river side, is in poor condition and ought to be rebuilt.

Slope walls.

The walls are not in good condition for some distance west of Rochester. They are in fair condition east to Wayne county line.

Canal banks, etc.

A large amount of material was excavated from prism at various points; from Wayneport east to lock 61 (Macedon); from Palmyra aqueduct to change bridge No. 35, and whenever necessary through the village; also, Port Gibson, Newark, Lyons, Lock Berlin and from Clyde east to the end of division.

The towpath on seventeen-mile level commencing at lock 62 and running east one and one-half miles, requires raising; the same is necessary between locks 62 and 63 (three-mile level) for about two miles.

Good water has been maintained during navigation. With the exception of the seventeen and three-mile levels requiring raising the banks are in good condition.

Part of the corps on this division have been engaged on surveys and examination of Chemung canal and feeder, also construction of dyke along Chemung river, east of Corning. This division has been under the charge of John Bisgood and F. N. Kimball as division and resident engineers, respectively.

Respectfully submitted.

JOHN BISGOOD,
Division Engineer.

Statement giving names, rank, number of days and compensation of engineers upon the repairs of the Western Division of the New York State canals, with incidental expenses, during the fiscal year ending September 30, 1892, *from October* 1, 1891, *to September* 30, 1892.

ORDINARY REPAIRS — ERIE CANAL.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total Amount.
John Bisgood	Division engineer	1 year	$2,400 per year	$2,400 00
John Bisgood	Division engineer	Expenses		281 05
F. N. Kimball	Resident engineer	245 days	2,000 per year	1,338 93
F. N. Kimball	Resident engineer	Expenses		118 21
W. T. Leighton	Assistant engineer	6 days	5 00 per day	30 00
W. T. Leighton	Assistant engineer	Expenses		1 22
M. W. Wilbur	Leveler	148½ days	4 50 per day	668 25
M. W. Wilbur	Leveler	Expenses		50 78
W. T. Leighton	Leveler	4 days	4 50 per day	18 00
W. T. Leighton	Leveler	Expenses		3 92
J. B. Barrett	Rodman	173½ days	3 50 per day	607 25
J. B. Barrett	Rodman	Expenses		29 96
D. M. Teller	Rodman	16 days	3 50 per day	56 00
Henry Geck	Chainman	280 days	2 50 per day	700 00
Henry Geck	Chainman	Expenses		9 44
D. M. Teller	Chainman	85½ days	2 50 per day	213 75
D. M. Teller	Chainman	Expenses		21 14
F. D. Ryan	Chainman	106 days	2 50 per day	265 00
F. D. Ryan	Chainman	Expenses		18 58
C. F. Stowell	Draughtsman	Plans of cylinder W. Main st. Br.		25 00
A. S. Kibbe	Asst. engineer in charge	72 days	$6 00 per day	432 00
A. S. Kibbe	Asst. engineer in charge	Expenses		182 99
Joseph Sweeny	Chainman	94 days	2 50 per day	235 00
Carleton Green	Chainman	71 days	2 50 per day	177 50
Carleton Green	Chainman	Expenses		133 41
				$8,017 38

Incidental expenses.

Stationery	$105 80	
Fuel, light and office rent	411 54	
Postage and telegraph	82 92	
Telephone	64 00	
Miscellaneous account	194 60	
		858 86
Total		$8,876 24

EXTRAORDINARY REPAIRS — ROWE STREET LIFT-BRIDGE, ROCHESTER, N. Y.

Act chapter 138, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total Amount.
F. N. Kimball	Resident engineer	3 days	$2,000 per year	$16 30
S. J. Fields	Draughtsman	Plans		220 00
M. W. Wilbur	Leveler	79½ days	4 50 per day	357 75
M. W. Wilbur	Leveler	Expenses		8 10
J. B. Barrett	Rodman	15 days	3 50 per day	52 50
J. B. Barrett	Rodman	Expenses		40
Henry Geck	Chainman	28 days	2 50 per day	70 00
Henry Geck	Chainman	Expenses		60
D. M. Teller	Chainman	14 days	2 50 per day	10 00
B. Frederick	Chainman	5 days	2 50 per day	12 50
				$748 15
Incidental expenses.				
Stationery				24 06
Total				$772 21

EXTRAORDINARY REPAIRS — WALL AT CORNING, N. Y.

Act chapter 300, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	16 days	$2,000 per year	$86 96
F. N. Kimball	Resident engineer	Expenses		44 05
M. W. Wilbur	Leveler	6 days	4 50 per day	27 00
M. W. Wilbur	Leveler	Expenses		22 10
J. B. Barrett	Rodman	8 days	3 50 per day	28 00
J. B. Barrett	Rodman	Expenses		34 40
D. M. Teller	Chainman	10 days	2 50 per day	25 00
D. M Teller	Chainman	Expenses		28 50
Total				$296 01

EXTRAORDINARY REPAIRS — GORDON MILL CULVERT, BROCKPORT, N. Y.

Act chapter 238, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	3 days	$2,000 per year	$16 30
F. N. Kimball	Resident engineer	Expenses		1 36
M. W. Wilbur	Leveler	1 day	4 50 per day	4 50
M. W. Wilbur	Leveler	Expenses		1 82
W. T Leighton	Leveler	22 days	4 50 per day	99 00
W. T. Leighton	Leveler	Expenses		8 96
J. B. Barrett	Rodman	1 day	3 50 per day	3 50
J. B. Barrett	Rodman	Expenses		1 82
D. M. Teller	Chainman	1 day	2 50 per day	2 50
D. M. Teller	Chainman	Expenses		1 82
				$141 58
Incidental expenses.				
Office rent				25 00
Total				$166 58

EXTRAORDINARY REPAIRS — SURVEY OF CHEMUNG CANAL AND FEEDER.

Act chapter 435, *Laws of* 1892.

NAME.	Rank.	Number of days, etc.	Rate of compensation	Total amount.
John R. Kaley	Asst. engineer in charge	50 days	$6 00 per day	$300 00
John R. Kaley	Asst. engineer in charge	Expenses		38 14
M. W. Wilbur	Leveler	7 days	4 50 per day	31 50
D. M. Teller	Rodman	51 days	3 50 per day	178 50
D. M. Teller	Rodman	Expenses		4 09
Edward Hierlihy	Chainman	31 days	2 50 per day	77 50
D. M. Teller	Chainman	6 days	2 50 per day	15 00
F. D. Ryan	Chainman	51 days	2 50 per day	127 50
F. D. Ryan	Chainman	Expenses		4 49
Wallace Greenalch	Chainman	28 days	2 50 per day	70 00
Wallace Greenalch	Chainman	Expenses		36 06
M. F. Wemple	Chainman	45 days	2 50 per day	112 50
M. F. Wemple	Chainman	Expenses		1 48
William B. Osborn	Chainman	47 days	2 50 per day	117 50
William B. Osborn	Chainman	Expenses		13 56
M. Murphy	Laborer	28 days	2 00 per day	56 00
M. Murphy	Laborer	Expenses		60
George W. McNish	Laborer	14 days	2 00 per day	28 00
George W. McNish	Laborer	Expenses		20
Incidental expenses.				$1,212 62
Stationery			$37 28	
Livery			110 00	
Office rent			8 75	
				156 03
Total				$1,368 65

EXTRAORDINARY REPAIRS — ADAMS BASIN CULVERT.

Act chapter 321, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	19 days	$2,000 per year	$93 22
F N. Kimball	Resident engineer	Expenses		10 06
M. W. Wilson	Leveler	2 days	4 50 per day	9 00
T. W. Wilson	Leveler	Expenses		1 12
W. T. Leighton	Leveler	34 days	4 50 per day	153 00
J. R. Barrett	Rodman	45 days	3 50 per day	157 50
J. B. Barrett	Rodman	Expenses		5 60
D. M. Teller	Chainman	102½ days	2 50 per day	256 25
D. M. Teller	Chainman	Expenses		25 99
Total				$711 74

EXTRAORDINARY REPAIRS — SEWER AND CULVERT AT MEDINA, N. Y.

Act chapter 298, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	20 days	$2,000 per year	$109 53
F. N. Kimball	Resident engineer	Expenses		32 88
M. W. Wilson	Leveler	1 day	4 50 per day	4 50
M. W. Wilson	Leveler	Expenses		2 24
W. T. Leighton	Leveler	112 days	4 50 per day	504 00
W T. Leighton	Leveler	Expenses		73 47
J. B. Barrett	Rodman	2 days	3 50 per day	7 00
J. B. Barrett	Rodman	Expenses		4 48
D. M. Teller	Chainman	2 days	2 50 per day	5 00
D. M. Teller	Chainman	Expenses		4 48
				$747 58
Incidental expenses				
Stationery				8 50
Total				$756 08

EXTRAORDINARY REPAIRS— DYKE AT CORNING, N. Y.

Act chapter 705, *Laws of* 1892.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	7 days	$2,000 per year	$38 04
F. N. Kimball	Resident engineer	Expenses		25 35
John R. Kaley	Asst. engineer in charge	8 days	6 00 per day	48 00
John R. Kaley	Asst. engineer in charge	Expenses		8 83
M. W Wilbur	Leveler	4 days	4 50 per day	18 00
M. W. Wilbur	Leveler	Expenses		9 80
J. B. Barrett	Rodman	17 days	3 50 per day	59 50
J. B. Barrett	Rodman	Expenses		16 14
Henry Geck	Chainman	4 days	2 50 per day	10 00
Henry Geck	Chainman	Expenses		9 80
M. F. Wemple	Chainman	6 days	2 50 per day	15 00
M. F. Wemple	Chainman	Expenses		8 10
				$266 56
Incidental expenses.				
Stationery				5 50
Total				$272 06

EXTRAORDINARY REPAIRS — BRIDGE AT TONAWANDA, N. Y.

Act chapter 32, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	42 days	$2,000 per year	$230 06
F. N. Kimball	Resident engineer	Expenses		49 96
M. W. Wilbur	Leveler	21 days	4 50 per day	94 50
M. W. Wilbur	Leveler	Expenses		28 55
W. T. Leighton	Leveler	28 days	4 50 per day	126 00
W. T. Leighton	Leveler	Expenses		19 65
J. B. Barrett	Rodman	15½ days	3 50 per day	54 25
J. B. Barrett	Rodman	Expenses		32 60
Henry Geck	Chainman	2 days	2 50 per day	5 00
Henry Geck	Chainman	Expenses		5 80
D. M. Teller	Chainman	27 days	2 50 per day	67 50
D. M. Teller	Chainman	Expenses		33 10
	Incidental expenses.			$746 97
Boat hire				10 00
Total				$756 97

EXTRAORDINARY REPAIRS—SMITH STREET CULVERT, BROCKPORT, N. Y.

Act chapter 238, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total amount.
F. N. Kimball	Resident engineer	3 days	$2,000 per year	$16 31
M. W. Wilbur	Leveler	1 day	4 50 per day	4 50
M. W. Wilbur	Leveler	Expenses		1 82
W. T. Leighton	Leveler	40 days	4 50 per day	180 00
W. T. Leighton	Leveler	Expenses		9 30
J. B. Barrett	Rodman	2 days	3 50 per day	7 00
J. B. Barrett	Rodman	Expenses		1 82
D. M. Teller	Chainman	1 day	2 50 per day	2 50
D. M. Teller	Chainman	Expenses		1 37
Total				$224 62

EXTRAORDINARY REPAIRS — CULVERT AT HOLLEY, N. Y.

Act chapter 152, *Laws of* 1889, *and act chapter* 221, *Laws of* 1891.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total Amount.
F. N. Kimball	Resident engineer	10 days	$2,000 per year	$54 35
F. N. Kimball	Resident engineer	Expenses		14 80
M. W. Wilbur	Leveler	3 days	4 50 per day	18 50
M. W. Wilbur	Leveler	Expenses		4 44
J. B. Barrett	Rodman	4 days	3 50 per day	14 00
J. B. Barrett	Rodman	Expenses		5 92
D. M. Teller	Chainman	11 days	2 50 per day	27 50
D. M. Teller	Chainman	Expenses		2 46
Total				$136 97

EXTRAORDINARY REPAIRS — IMPROVING CANAL AT BUFFALO, N. Y.

Act chapter 476, *Laws of* 1892.

NAME.	Rank.	Number of days, etc.	Rate of compensation.	Total Amount.
W. T. Leighton	Assistant engineer	24 days	$5 00 per day	$120 00
W. T. Leighton	Assistant engineer	Expenses		7 77
W. T. Leighton	Leveler	23 days	4 50 per day	103 50
W. T. Leighton	Leveler	Expenses		17 27
M. W. Wilbur	Leveler	41 days	4 50 per day	184 50
M. W. Wilbur	Leveler	Expenses		7 02
J. B. Barrett	Rodman	31 days	3 50 per day	108 50
Edward Bapst	Chainman	27 days	2 50 per day	67 50
J. J. Lynch	Chainman	21 days	2 50 per day	52 50
Louis Brunner	Chainman	27 days	2 50 per day	67 50
Henry Neenan	Chainman	27 days	2 50 per day	67 50
W. H. Girven	Chainman	20 days	2 50 per day	50 00
J. J. Lynch	Laborer	16 days	2 50 per day	40 00
Henry Neenan	Laborer	16 days	2 50 per day	40 00
R. T. Brennan	Laborer	18 days	1 75 per day	31 50
Total				$965 06

SUMMARY OF ENGINEERING EXPENSES UPON THE WESTERN DIVISION, NEW YORK STATE CANALS, FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1892.

Extraordinary repairs:

	Amount.
Rowe street lift-bridge, Rochester, chapter 138, Laws 1891	$772 21
Holley culvert { chapter 152, Laws 1889 chapter 221, Laws 1891 }	136 97
Improving canal at Buffalo, chapter 476, Laws 1892	965 06
Tonawanda bridge, chapter 82, Laws 1891	756 97
Smith street culvert, Brockport, chapter 238, Laws 1891,	224 62
Gordon Mill culvert, Brockport, chapter 238, Laws 1891,	166 58
Wall at Corning, chapter 300, Laws 1891	296 01
Dyke at Corning, chapter 705, Laws 1892	272 06
Culvert at Adams Basin, chapter 321, Laws 1891	711 74
Sewer and culvert at Medina, chapter 298, Laws 1891	756 08
Survey of Chemung canal and feeder, chapter 435, Laws 1892	1,368 65
Ordinary repairs	8,876 24
Total engineering expenses for Western Division	$15,303 19

ERIE CANAL.

List of bridges on Western Division.

Number.	CAST-IRON.					WROUGHT-IRON.						WOOD AND IRON.	WOOD.		Remarks.
	Whipple arch.	Whipple trapezoidal.	Bollman.	Swartz.	Pipe.	Cooper's arch.	Bowstring.	Lattice.	Lift	Swing.	Roof.	Whipple.	Whipple.	Draw.	
1	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Wayne county line.
2	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Pit lock.
3	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Waldruffs
4	......	......	......	......	......	......	......	......	1	......	......	......	......	......	Glascow street, Clyde.
5	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Sodus street, Clyde.
6	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Sigman's.
7	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Barker's.
8	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Long's.
9	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Lock Berlin.
10	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Horton's.
11	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Goetzman's.
12	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Klau's.
13	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Richmond.
14	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Cole's.
15	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Geneva street, Lyons.
16	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Church street, Lyons.
17	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Water street, Lyons.
18	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Leach's.
19	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Prine's.
20	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Park's.
21	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Mosher's.
22	......	......	......	......	......	......	1	......	......	......	......	......	......	......	Towpath change
23	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Lockville.
24	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Charles street, Newark.
25	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Main street, Newark.
26	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Allerton's.
27	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Peck's.
28	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Sweezey's.
29	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Palmer's.
30	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Port Gibson.
31	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Galloway's.

31½	......	......	......	1	......	......	......	......	......	......	......	......	......	......	Kent street.
32	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Railroad avenue, Palmyra.
33	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Market street, Palmyra.
34	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Church street, Palmyra.
35	......	......	......	......	1	......	......	......	......	......	......	......	......	......	Towpath change, Palmyra.
36	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Crandall's.
37	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Clark's.
38	1	......	......	......	......	......	......	......	......	......	......	......	......	......	White's.
39	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Towpath change and highway, Macedon.
40	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Macedon.
41	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Frear's.
42	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Wayneport.
43	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Knapp's.
44	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Baker's.
45	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Parker's, Fairport.
46	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Main street, Fairport.
47	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Fullam's Basin.
48	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Wapping.
49	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Wiltsie's.
50	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Bushnell's Basin.
51	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Cartersville.
52	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Guernsey's.
53	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Pittsford
54	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Main street, Pittsford.
55	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Sutherland's.
56	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Cook's.
57	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Weed's
58	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Billinghurst's.
59	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Donnelly's.
60	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Drake's.
61	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Brighton.
62	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Culver road.
63	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Monroe avenue, Rochester.
64	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Goodman street, Rochester.
65	......	......	......	......	......	1	......	......	......	......	......	......	......	......	Nelson street, Rochester.
66	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Averill street, Rochester.
67	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Alexander street, Rochester.
67½	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Pinnacle avenue, Rochester.
68	......	......	......	......	......	......	......	1	......	......	......	......	......	......	St. Paul street, Rochester.
69	......	......	......	......	1	......	......	......	......	......	......	......	......	......	Griffith street, Rochester.
70	......	......	......	......	......	......	1	......	......	......	......	......	......	......	Tow-path change, weigh-lock, Rochester.
71	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Court street, Rochester.
73	......	......	......	......	......	......	......	......	......	1	......	......	......	......	Exchange street, Rochester.
74	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Fitzhugh street, Rochester.
76	......	......	1	......	......	......	......	......	......	......	......	......	......	......	Washington street, Rochester.
76½	......	......	......	......	......	......	......	......	1	......	......	......	......	......	Caledonia avenue, Rochester.
77	......	......	......	......	......	......	......	......	1	......	......	......	......	......	West avenue, Rochester.
78	......	......	1	......	......	......	......	......	......	......	......	......	......	......	Ford street, Rochester.
79	......	......	......	......	1	......	......	......	......	......	......	......	......	......	Towpath over Genesee Valley canal, Rochester.
82	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Jay street, Rochester.

ERIE CANAL — *List of bridges, etc.* — (*Continued*).

Number.	CAST-IRON.					WROUGHT-IRON.						WOOD AND IRON.	WOOD.		Remarks.
	Whipple arch	Whipple trapezoidal.	Bollman.	Swartz.	Pipe.	Cooper's arch.	Bowstring.	Lattice	Lift.	Swing.	Roof.	Whipple.	Whipple.	Draw	
85			1												Emerson street, Rochester.
86									1						Rome street, Rochester.
87							1								Towpath change.
88												1			Scott's.
89													1		Four-mile grocery.
90												1			Spier's.
91		1													Six-mile grocery.
92												1			Douglas'.
93												1			Finley's.
94												1			South Greece.
95	1														Cromwell's.
96	1														Hiscock's.
97												1			Norman's.
98	1														Union street, Spencerport.
99	1														Amity street, Spencerport.
100	1														Webster's, east.
101													1		Webster's, west.
102		1													Cressy's, Adams Basin.
103	1														Adams Basin.
104	1														Doty's.
105	1														Brockway's.
106	1														Cooley's Basin.
107	1														Mechanic street, Brockport.
108									1						Main street, Brockport.
109	1														Smith street, Brockport.
110	1														Danforth's.
111								1							Miner's.
112	1														County line, Monroe and Orleans.
113							1								Orr's.
114	1														Frisby's, old canal, Holley.
115	1														Holley.
116	1														McCarty's.
117				1											Tuttle's.
118												1			McGuire's.
119	1														Hulberton.

120	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Brockville.
121	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Hindsburgh.
122	....	....	....	....	....	....	1	....	....	....	....	....	....	....	Transit road.
123	....	....	....	....	....	....	....	....	....	....	....	1	....	....	Jaginth's.
124	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Bidwell's.
125	....	....	....	1	....	....	....	....	....	....	....	....	....	....	Brailey's.
126	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Hall's.
127	....	....	1	....	....	....	....	....	....	....	....	....	....	....	Ingersoll street, Albion.
128	....	....	....	....	....	....	....	....	....	1	....	....	....	....	Batavia street, Albion.
129	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Lattin's
130	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Gaines Basin.
131	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Eagle Harbor.
132	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Starkweather's.
133	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Allen's.
134	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Long's.
135	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Knowlesville.
136	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Beal's.
137	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Hasting's.
138	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Holloway's, Medina.
139	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Church street, Medina.
140	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Shelby street, Medina.
140½	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Prospect street, Medina.
141	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Jackson's.
142	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Shelby Basin.
143	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Town line
144	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Vernon street, Middleport.
145	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Main street, Middleport.
146	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Williams'.
147	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Watson's.
148	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Hurd's.
149	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Reynales' Basin.
150	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Mabee's.
151	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Gasport.
152	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Orangeport.
153	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Millard's.
154	....	....	....	....	....	....	....	....	....	....	....	....	1	....	Wakeman's.
155	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Young's, Lockport.
156	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Comstock's, Lockport.
157	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Adams street, Lockport.
158	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Chapel street, Lockport.
159	....	....	1	....	....	....	....	....	....	....	....	....	....	....	Exchange street, Lockport.
160	....	....	....	....	....	....	....	....	....	....	....	1	....	....	Cady's, Lockport.
161	....	1	....	....	....	....	....	....	....	....	....	....	....	....	Pine street, Lockport, two spans.
162	....	....	....	....	....	....	....	....	....	....	1	....	....	....	Cottage street, Lockport.
163	....	....	....	....	....	....	....	....	....	....	1	....	....	....	Main street, Lockport.
164	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Transit road, Lockport.
164½	....	....	....	....	....	....	....	1	....	....	....	....	....	....	Prospect street, Lockport.
165	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Hitchins'.
166	1	....	....	....	....	....	....	....	....	....	....	....	....	....	Heacox's, one iron and two wood spans.
167	....	1	....	....	....	....	....	....	....	....	....	....	....	....	Hawley's, one iron and two wood spans.

ERIE CANAL — *List of bridges, etc.* — (*Continued*).

	CAST-IRON.					WROUGHT-IRON.						WOOD AND IRON.	WOOD.		
Number.	Whipple arch.	Whipple trapezoidal.	Bollman.	Swartz.	Pipe.	Cooper's arch.	Bowstring.	Lattice.	Lift.	Swing.	Roof.	Whipple.	Whipple.	Draw.	Remarks.
168	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Sulphur Springs guard-lock, three spans of wood.
169	......	1	......	......	1	......	......	......	......	......	......	......	......	......	Pendleton highway and towpath change.
170	......	......	......	......	1	......	......	......	......	......	......	......	......	......	Old canal, Pendleton.
171	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Towpath over Tonawanda creek, Pendleton, three spans.
172	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Ransom creek, towpath.
173	......	......	......	......	......	......	......	......	......	......	......	1	......	......	New Home, two spans.
174	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Pickard's, two spans wood and iron and one wood.
175	......	......	......	......	......	......	1	......	......	......	......	......	......	......	Bush's, near Martinsville.
175½	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Connecting Delaware ave. and Main st., Tonawanda, three spans.
176	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Ellicott creek towpath, Tonawanda.
177	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Main street, Tonawanda.
178	1	......	......	......	......	......	......	......	......	......	......	......	......	......	River lock slip, Tonawanda.
179	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Seymour street, Tonawanda.
180	......	......	1	......	......	......	......	......	......	......	......	......	......	......	Bouck street, Tonawanda.
181	......	......	......	......	1	......	......	......	......	......	......	......	......	......	Towpath change, Tonawanda.
182	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Grand Island ferry.
183	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Three mile.
184	......	......	......	......	......	......	......	......	......	......	......	1	......	......	Cherry's.
185	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Lineberg's.
186	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Scott's, Grand Island ferry.
187	......	......	......	......	1	......	......	......	......	......	......	......	......	......	Towpath change, Black Rock.
188	......	......	......	......	......	......	1	......	......	......	......	......	......	......	Towpath lift, north side canal (Swartz) Black Rock.
189	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Bird street, Black Rock.
189½	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Austin street, Black Rock.
190	......	......	......	......	......	1	......	......	......	......	......	......	......	......	Hamilton street, Black Rock.
191	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Amherst street, Black Rock.
192	......	......	......	......	......	......	......	......	......	......	......	......	1	......	Mill street, Black Rock.
193	......	......	......	......	......	......	......	......	......	......	......	......	......	1	Scajaquada creek, towpath.
194	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Ferry street, Upper Black Rock.
195	......	......	......	......	......	......	......	......	......	1	......	......	......	......	Continuation of Ferry st. across harbor, to ferry for Canada.
196	......	......	......	......	......	......	......	1	......	......	......	......	......	......	York street, towpath change and highway, Buffalo.
196½	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Hudson street, Buffalo.
197	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Georgia street, Buffalo.
198	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Towpath slip No. 3, Buffalo.

199	......	......	......	......	......	......	......	......	......	......	......	......	......	1	Wilkinson slip, Buffalo.
200	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Genesee street, Buffalo.
201	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Towpath slip No. 2, Buffalo.
202	......	......	......	......	......	......	1	......	......	......	......	......	......	......	Towpath slip No. 1, Buffalo.
203	1	......	......	......	......	......	......	......	......	......	......	......	......	......	Erie street, Buffalo.
204	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Commercial street, Buffalo.
207	......	......	......	......	......	......	......	1	......	......	......	......	......	......	Lloyd street, Buffalo.
	81	5	6	8	7	2	8	28	5	3	2	22	34	2	

ERIE CANAL — *List of bridges, etc* — (Concluded).

COMMERCIAL SLIP, BUFFALO.

	CAST-IRON.	
Number.	Whipple arch.	Remarks.
205	1	Canal streeet
206	1	Prince street
....	......	......
....	......	......
....	2	

OHIO SLIP, BUFFALO.

	CAST-IRON.	WROUGHT-IRON.		
Number.	Whipple arch	Swing.	Bowstring.	Remarks.
217	1	....	....	Perry street.
218	1	....	....	Fulton street.
219	....	....	1	Elk street.
220	....	1	...	Ohio street.
....	2	1	1	

HAMBURGH CANAL, BUFFALO.

	CAST-IRON.	WROUGHT-IRON.	
Number.	Whipple arch.	Lattice.	Remarks.
208	1	....	Main street
209	....	1	Washington street
214	1	....	Michigan street
215	1	....	Chicago street
216	....	1	Louisiana street
....	3	2	

CLARK AND SKINNER CANAL. BUFFALO.

	CAST-IRON.		
Number.	Whipple arch.	Bollman.	Remarks.
210	1	....	Scott street.
211	1	....	Perry street.
212	....	1	Elk street.
213	....	1	Ohio street.
....	....	....	......
....	2	2	

SUMMARY.

	CAST-IRON.					WROUGHT-IRON.						WOOD AND IRON.	WOOD.		
	Whipple arch.	Whipple trapezoidal	Bollman.	Swartz.	Pipe.	Cooper's arch.	Bowstring.	Lattice.	Lift.	Swing.	Roof	Whipple.	Whipple.	Draw.	Total.
Erie canal	81	5	6	3	7	2	8	28	5	3	2	22	34	2	208
Commrecial slip	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Hamburgh canal	3	....	....	....	....	....	....	2	....	.	....	....	....	...	5
Clark and Skinner canal	2	....	2	....	....	....	1	....	....	....	....	....	....	....	4
Ohio slip	2	....	....	....	....	....	....	....	....	1	....	....	....	....	4
Oak Orchard creek feeder, on Batavia road, Orleans county	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
	90	5	8	3	8	2	9	30	5	4	2	22	34	2	224

REPORT

OF THE

ENGINEER IN CHARGE

OF THE

HUDSON RIVER IMPROVEMENT

FOR THE YEAR 1892.

APPENDIX D.

ALBANY, N. Y., *December* 1, 1892.

MARTIN SCHENCK, *State Engineer and Surveyor:*

Sir.— I have the honor to transmit herewith my report on the improvement of the Hudson river for the current year.

Yours respectfully,
CHAS. G. WITBECK,
Assistant Engineer in Charge.

By provisions of chapter 293 of the Laws of 1892, there was appropriated by the State the sum of $35,000 for the purpose of removing obstructions from and improving the navigation of the Hudson river from the city of Troy to the south line of the town of Coxsackie in such manner as would secure, between the sloop lock and the railroad bridge at Troy, a channel eighty feet wide with six feet depth of water at low tide, and between the railroad bridge at Troy and the lower railroad bridge at Albany a channel 140 feet wide with ten feet depth and thence to the south line of the town of Coxsackie a channel 175 feet wide, with eleven feet depth.

This law also provided that out of the amount appropriated thereby a sum not exceeding $3,000 could be expended in improving the westerly channel at Coeymans and a sum not exceeding $5,000 could be expended in improving the easterly channel at Stuyvesant. There was also appropriated, by chapter 607 of the Laws of 1892, the sum of $8,000 for removing obstructions in and improving the navigation of the westerly channel of the river from a point opposite the line between the towns of New Baltimore and Coxsackie, in the county of Greene, to a point opposite the lower ice-house on the westerly shore of the Hudson river in the town of Coxsackie.

As the laws above quoted place the control of the engineering operations contingent on this work in the hands of the State Engineer and Surveyor, a corps consisting of one assistant engineer in charge, one leveler, one rodman and two chainmen, was organized on the 18th day of April, 1892, and have been since constantly employed making necessary surveys, maps and estimates and exercising such supervision over the work of the contractors as the nature of the case demanded. Complete reconnaissance soundings, between Coxsackie and the State dam at Troy, were taken at as early a date after the subsidence of the spring freshets as the condition of the river would allow, and where bars were found immediate investigation was made as to the causes of their formation and careful surveys completed as soon as practicable of those points where it was deemed advisable to commence dredging operations. A list of the principal points to which these surveys were confined is as follows:

1. Reconnaissance of channel.
2. Bath shoals.
3. Upper railroad bridge shoal (Albany).
4. Inside or easterly channel at Stuyvesant.
5. Inside or westerly channel at Coeymans.
6. Dumping grounds behind Overslaugh Dyke No. 2.
7. Upper side-cut at West Troy.
8. Lower side-cut at West Troy.
9. Washington bar.
10. Covill's Folly.
11. Round shoals.
12. Upper fish-house shoals.
13. Railroad to Congress street bridge, Troy.
14. Nine-mile tree shoal.
15. Inside or westerly channel, at Coxsackie.
16. New Baltimore bar.
17. Mull's light bar.
18. Survey for repairing and raising State dyke at Mull's light.

Final surveys were also made at all locations where dredging was completed.

This only in part represents the work performed by the engineering corps, as considerable time was used in making examinations of possible dumping-grounds, laying out work under contract, running lines of levels, setting tide-gauges and ranges and exercising a general supervision over the work.

As there were no serious "ice gorges" formed during the winter of 1891 and 1892, the bars formed this spring were not so extensive as usual.

I herewith append a table, showing dates of the several surveys, location of the same, estimates of materials to be removed, date of letting of contract, name of contractor, price at which let and amount of final payment.

Owing to the fact that the appropriation for improving the side channels at Stuyvesant and Coxsackie was strictly limited by law to $5,000 and $3,000, respectively, this work was only in part completed, and further appropriations should also be made for repairing and raising the dykes at Pixaway island, at Cuyler's light and Mull's light, for which I estimate cost as follows:

For completing easterly channel at Stuyvesant	$6,000
For completing the westerly channel at Coxsackie	6,000
For repairing and raising with stone, State dyke, at Mull's light	3,750
For repairing dyke at Pixaway island	160
For repairing dyke at Cuyler light	160
Total	$16,070

The difficulty heretofore experienced in providing suitable dumping-grounds for the material dredged from the river channel, and so strongly complained of by my predecessors, has been encountered this year with increased severity, owing to the provisions of the so-called "Edmunds-Rider" River and Harbor bill, passed by the United States Congress on the 9th day of September, 1892, from which I quote the following section:

"§ 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty or structure of any kind outside established harbor lines or in any navigable waters of the United States where no harbor lines are or may be established, without the permission of the secretary of war, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters, and it shall not be lawful hereafter to commence the construction of any bridge, or bridge-draw, bridge piers and abutments, causeway or other works over or in any port, road, roadstead, haven, harbor, navigable river or navigable waters of the United States, under any act of the legislative assembly of any state, until the location and plan of such bridge or other works have been submitted to and approved by the secretary of war, or to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of the channel of said navigable water of the United States, unless approved and authorized by the secretary of war; provided, that this section shall not apply to any bridge, bridge-draw, bridge-piers and abutments, the construction of which has been heretofore duly authorized by law or to be so construed as to authorize the construction of any bridge, draw-bridge, bridge-piers and abutments or other works, under an act of the legislature of any state, over or in any stream, port, roadstead, haven or harbor, or other navigable water not wholly within the limits of such state."

This law prohibits the dumping of any dredged material alongside of any dock or dyke, although it may be dumped there with the intention of immediately re-excavating it and using it for paving of streets, by which use it would be permanently disposed of and all danger of its returning back into the river channel removed. I fully concur in the recommendations made by my predecessors that if the policy of the State in the future should be to proceed with further dredging in this river, that as soon as possible some one of the now practical plants for pumping up and disposing of the dredged material back of existing dykes be purchased by the State.

The improvement of the Hudson river is a question, to the consideration of which has been brought the attention of many of the most eminent hydrographic engineers of this and other countries; forming as it does the connecting link between the Erie and Champlain canals and the ocean. It has been universally acknowledged that the maintenance of its channel was of vital importance, not only to the growth of our metropolitan city but to the maintenance of the commercial supremacy of our State.

In the year 1818 the volume of products reaching the seaboard over this waterway was 21,000 tons. In the year 1890 this had increased to 19,000,000 tons. This bare statement more than fulfills the most sanguine predictions made by the most zealous advocates of State aid for this purpose, during the years between these dates. This result has not, however, been reached without great labor and much expenditure of money, much of which, in the earlier days of the history of this movement was unwisely spent upon badly devised plans. The first appropriation made by the State of New York for improving the channel of the Hudson river, was in the year 1797 and this was supplemented by other appropriations in the years 1799, 1800, 1801, 1803, 1805, 1807, 1810, 1812, 1813 and 1818. Most of the moneys appropriated by the aforenamed laws were expended in the construction of wing dams or piers, built in the neighborhood of existing shoals and projecting from the shores toward the natural channel of the river, contracting the waterway at these points, with the expectatiton that the action of the freshets would scour the channel and prevent the formation of bars. This system had been successfully used in Holland but proved an entire failure upon this river, and in the years 1819 and 1820 a commission, appointed in pursuance of law, made the first hydrographic survey of the river. This survey was located between the city of Troy and the village of New Baltimore and was made by John Randall, Jr. The resulting map, filed in the office of the State Engineer and Surveyor, indicates that the greatest depth of water at the low-water stage in that year, over the various shoals, was scant five feet. This discouraging condition existed after the expenditure of nearly $170,000 derived from appropriations made by the State and contributions made by the cities of Troy and Albany, in efforts to improve the channel of the river.

At this time the record shows that the abandonment of the river channel was seriously contemplated and the construction of a canal between Albany and New Baltimore, a distance of about twelve and a half miles, seemed to be the only solution of this perplexing problem. This plan had been advocated by General Genet, an eminent French engineer, in the year 1810, and was also concurred in by Dewitt Clinton, in 1820, and by Benjamin Wright, one of the most practical civil engineers of the day, in 1823. In 1833, the citizens of Albany and Rensselaer counties united in a petition to the Legislature, praying them to carry out this plan, and, as late as the year 1853, a report was made to prominent citizens of Albany and through them submitted to the Legislature by William J. McAlpine, C. E., recommending a ship canal between Albany and New Baltimore, twelve miles in length, 120 feet wide and twenty feet in depth, with locks at each end 300 feet long and fifty feet in width, the supply of water to be maintained by pumping, the estimated cost being $2,450,000 for the canal alone, with an annual estimated cost of $75,000 for maintenance. This did not include an estimated cost for engines and pumps, or, if the water supply was impounded, an estimated cost of $428,000, for the construction of the necessary reservoirs. This shows that at this era a very unsatisfactory condition of the river channel still existed, after an expenditure, in a detached and desultory way, for over fifty years, of nearly $1,000,000 of appropriations made by the State and nation, supplemented by contributions made by the cities of Troy and Albany. The problem of the real improvement of the Hudson river was retarded rather than facilitated; much time and large sums of money were expended in operations which simply removed one bar to form another. Expensive wing dams and high longitudinal dykes were constructed seven, eight and nine feet above ordinary high water, under the mistaken idea that the corroding action of the freshets would tend to deepen the channel, completing ignoring any consideration of the reflex action of the tides. These were completed in part, only to be left to slow decay after failing of their purpose, and aggravating the spring freshets. Too much credit can not be given to Major

Delafield, of the United States Corps of engineers, for research which resulted in the practical solution of this problem. After making a survey of the Hudson river, he made an exhaustive report in the year 1852, condemning the system and plan of improvement theretofore adopted, as a serious evil, adding artificial to natural obstructions, making the channel worse than when left in its original condition, and recommending the construction of longitudinal dykes submerged at high water. Thus the dykes were protected from injury by ice and spring freshets and the river channel given a uniform cross section. He further recommended that the volume of flow be facilitated by judicious dredging. Nothing was done towards carrying out these recommendations until 1863, when the initial work was commenced by the State of New York, since which time a similar policy has been pursued by the United States authorities in such improvements on this river as have been made by them. This policy has been carefully carried out by my predecessors with the gratifying result of practically deepening the channel of the river from scant five feet at mean low water, in 1819, to from ten to eleven at mean low water in 1892. Great credit should be given to the officers of the State, having the matter in charge for the judicious dredging performed and for the careful disposition of the dredged material behind the dykes and bulkhead which prevented its return into the channel. The dykes, while they are invaluable in assisting to confine and form the artificial waterway, as well as in retarding the rapid discharge of the freshet currents, do not entirely prevent the formation of ice dams, and the annual deposits of the spring freshets at their unavoidable angles. These points require constant attention, and it is therefore necessary, if the present efficiency of this waterway is to be maintained, for either the State or nation to make annual appropriations for removing the obstructions which are annually formed. Past experience has developed the fact that navigation on this river is annually impeded and sometimes entirely obstructed by the formation of these bars, as was the case in the years, 1880, 1884, 1885 and 1887, at Fish-house shoal, Bogart light, Van Wie's light and Round shoals, and to a less extent in other years during the last decade.

The following table shows the appropriations made by the State of New York for improving the navigation of the Hudson river, from 1797 to 1892, inclusive:

YEAR.	Chapter.	Amount.	YEAR.	Chapter.	Amount.
1797	39	$7,500 00	1867	647	$150,000 00
1799	20	3,750 00	1872	346	50,000 00
1800	25	28,000 00	1873	713	50,000 00
1801	68	10,000 00	1876	204	40,000 00
1802	8	5,000 00	1877	412	15,000 00
1803	68	7.500 00	1878	205	30,000 00
1804	67	20,000 00	1879	106	30,000 00
1810	133	30,000 00	1880	51	30,000 00
1811	188	15,000 00	1881	230	30,000 00
1812	157	19,852 66	1882	372	30,000 00
1813	185	7,000 00	1883	451	30,000 00
1827	296	21,000 00	1884	110	30,000 00
1829	374	1,000 00	1885	210	30,000 00
1840	95	500 00	1886	172	25,000 00
1849	406	10,000 00	1887	162	30,000 00
1852	395	10,000 00	1888	173	50,000 00
1857	374	25,000 00	1889	106	50,000 00
1858	361	1,000 00	1890	204	30,000 00
1863	122	100,000 00	1892	293	35,000 00
1864	105	134,326 63	1892	607	8,000 00
1865	561	125,000 00			
1866	491	150,000 00	Total	......	$1,504,429 29

N. B.— There has also been contributed by the city of Troy, from 1825 to 1867, $127,248.59, and by the city of Albany, $5,566.66 ; total, $132,815.25.

THE FOLLOWING TABLE SHOWS THE PRICES PAID BY THE STATE FOR DREDGING IN THE HUDSON RIVER FROM 1883 TO 1892, INCLUSIVE (CENTS PER CUBIC YARD).

LOCATION.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1892.
Troy dam to railroad bridge	......	....	$12\frac{3}{4}$	....	......	......	27	38	.....
Congress street bridge, Troy	......	....	....	....	......	38	18	25	.....
Upper railroad bridge, Troy	......	....	....	....	$22\frac{7}{8}$	......	......	......	32
Watervliet arsenal dock	......	....	....	....	......	35	......	......	.....
Washington bar	......	....	$34\frac{9}{10}$	....	......	25	......	17	32
Van Buren bar	......	....	....	....	......	25	......	$29\frac{9}{10}$	.....
Covill's Folly	......	17	$13\frac{8}{9}$	$13\frac{5}{8}$	$29\frac{7}{8}$	......	26	13	.....
Round shoals	......	15	$13\frac{8}{9}$	11	$22\frac{7}{8}$	$24\frac{9}{10}$	18	......	.....
Fish-house shoals	......	....	$25\frac{1}{2}$	....	......	25	15	......	.....
Kellogg shoals	20	....	$13\frac{8}{9}$	$9\frac{5}{8}$	......	25	17	......	.....
Bath shoals	$28\frac{7}{8}$	....	....	....	......	25	......	......	14
Railroad bridges, Albany	......	....	$13\frac{3}{10}$	....	......	23	$11\frac{1}{2}$	......	14
Cuyler bar	......	....	....	...	$19\frac{7}{8}$	......	......	10	.....
Cuyler and Bogart crossover	$13\frac{7}{8}$	13	....	....	......	......	$10\frac{1}{2}$	......	.....
Bogart light	$13\frac{7}{8}$	....	$9\frac{8}{9}$	14	$11\frac{3}{4}$	$16\frac{7}{8}$	$13\frac{8}{9}$	......	.....
The overslaugh	$10\frac{5}{8}$	....	....	....	$13\frac{7}{8}$	$17\frac{3}{8}$	$13\frac{1}{4}$	......	.....
Parda hook	$10\frac{9}{10}$	....	....	....	$10\frac{3}{4}$	$15\frac{1}{2}$	10	......	.....
Nine-mile Tree	$10\frac{9}{10}$	....	....	$17\frac{5}{8}$	......	16	$12\frac{9}{10}$	$8\frac{3}{4}$	.....
Mull's bar	......	....	....	....	$16\frac{3}{4}$	$15\frac{9}{10}$	......	$9\frac{15}{100}$	.....
Coeymans, west channel	......	....	....	....	......	......	13	$10\frac{9}{10}$	$9\frac{1}{3}$
New Baltimore light	$10\frac{9}{10}$	....	....	....	$12\frac{7}{8}$	14	......	......	.....
Stone-house bar	......	....	....	....	......	$16\frac{1}{2}$	......	......	.....
Stuyvesant	......	....	....	....	$9\frac{3}{4}$	......	......	......	$15\frac{8}{9}$
Coxsackie	......	....	....	....	......	......	......	......	34

Bench-marks.

The following list shows location and description of permanent bench-marks established along the line of the river. Elevations given are elevations of bench-marks above mean low tide at the points of location:

State Dam to Troy Steel Works.

No	Description.	Elevation above mean low water.
1.	Bolt ring fastening at northeast corner of sloop lock,	18.208
2.	Northeast corner of sloop lock, marked X	18.045
3.	Southwest corner of sloop lock, marked X	18.010
4.	Bolt of ring fastening in rock ten feet south of south face of Rensselaer street dock	9.911
5.	Northwest corner of protection stone on southeast corner of River street and Bridge avenue, marked X	32.689
6.	North end of sill of doorway north of angle in building (Mann's store) not marked	13.884
7.	On southwest corner of plinth of door-post of Samuel Goggin's store on Front street, second door south of Congress street, marked X	14.170
8.	Protection stone at east end and south side of Congress street bridge, marked X	31.045
9.	Large square protection stone northeast corner of River and Adams street, marked X	22.675

Between Troy and Albany.

No	Description.	Elevation above mean low water.
10.	Stone between railroad tracks, part of north wall of drain culvert, 125 feet south of the Sulphur Spring house, marked X	21.880
11.	Southwest corner of box culvert opposite Island park dock, marked X	11.532
12.	Southeast wing of brick arch culvert opposite high dyke, marked X HI	22.072
13.	Southeast wing wall of second culvert north of Bath rifle range and opposite Pleasure island dock, marked X HI	22.437

No.	Description.	Elevation above mean low water.
14.	Northeast wing wall of box culvert at Bath rifle range, marked X HI	18.661
15.	Southwest corner of Strobler's malt-house, north of Bath (on water table), marked X HI	20.077

Albany and Greenbush.

No.	Description.	Elevation above mean low water.
16.	East wall of pier of lock No. 1, Erie canal, five feet from face of wall and nine and three-fourth feet from northeast corner, marked X	9.486
17.	Water table, third aperture on east front of Mulpeter's store, corner of State and Quay streets, marked X	11.833
18.	Cross cut on west face of Irwin's elevator, Greenbush, west corner of building, marked X	13.286

Greenbush to Castleton.

No.	Description.	Elevation above mean low water.
19.	On top of monument station No. 156 of New York State survey, fifteen feet south of southwest corner of Mould's ice-house	19.917
20.	West corner stone beacon at Van Wie's point, marked X	6.672
21.	On rock forty-five feet west of Van Wie's dock, marked X	5.439
22.	Cross mark on rock south of Staat's point on river shore, marked X	8.960
23.	Protection stone southeast corner of River and Middle streets, Castleton, marked X	18.871

Castleton to New Baltimore.

No.	Description.	Elevation above mean low water.
24.	Top of monument of station No. 172, New York State survey, midway between nine-mile tree and Mull's light	3.368
25.	Southwest corner of foundation of west hay barn at Coeymans, marked X	7.279
26.	On stone window-sill south side of small storehouse on Coeymans dock marked X	6.067

New Baltimore to Coxsackie.

No.	Description.	Elevation above mean low water.
27.	Southeast corner of foundation of south part of Knickerbocker ice-house at New Baltimore, marked X	8.925
28.	Southeast wing wall of bridge on Hudson River railroad opposite south end of Houghtailing's island, marked X	7.147
29.	Top of monument No. 244, New York State survey	22.858
30.	Southeast wing wall of culvert, north of first house north of Stuyvesant depot, marked X	7.978
31.	Southwest corner of door step to waiting-room, passenger depot at Stuyvesant, marked X	14.323
32.	Copper bolt in wall on highway east side of the Hudson River railroad, between the houses of Sickles and Herrick, one-half mile south of Stuyvesant station	19.752
33.	High point on rock at south end of long fill on Hudson River railroad, north of Nutten Hook bay, marked B. M. X	12.622
34.	On foundation timber northeast corner of Nutten Hook ice-house, opposite Coxsackie	15.838
35.	On northeast corner of signal stand foundation, on east side of Hudson River railroad tracks, opposite station, marked X	10.798

In connection with the foregoing list of bench-marks the following elevations are given, showing mean low tide at the several points named referred to the same plane of levels.

Assuming the elevation of mean low tide at Governor's island, New York harbor at O. O. then the elevation of mean low tide at the following points will be at:

Coxsackie	1.840
Stuyvesant	2.124
New Baltimore	2.346
Coeymans	2.730
Castleton	3.205

Van Wie's point	3.284
Greenbush	3.623
Albany	3.644
Bath	3.683
Fish-house light	3.906
Steel works, Troy	4.144
Troy elevator	4.271
Railroad bridge, Troy	4.290
Cheney's dock, Troy	5.203
State dam, Troy	5.705

Also mean rise and fall of tide at the following named places:

Coxsackie	3,95
Stuyvesant	3.67
New Baltimore	3.42
Coeymans	2.87
Castleton	2.53
Albany	2.32
Steel works, Troy	1.94
State dam, Troy	.43

In concluding this report it gives me great pleasure to state that the records of this department show that since the adoption of the recommendations heretofore referred to, made by Major Delafield, the sums of money placed at its disposal for the improvement of this river have been intelligently and effectively expended. Legislation recently enacted by the Congress of the United States and looking toward a radical deepening and widening of the channel of the river will, perhaps, for the present at least, render it unnecessary for the State to make any further large expenditures in this direction. It is, however, important that sufficient sums should be appropriated to enable the State to preserve its dykes in their present degree of efficiency and to maintain such lateral channels as are necessary to preserve and foster the commerce originating at the several villages situated between Albany and Hudson.

STATEMENT OF DISBURSEMENTS MADE BY THE ENGINEERING DEPARTMENT OF THE HUDSON RIVER IMPROVEMENT FOR THE YEAR 1892.

MONTH.	Salaries.	Hotel and travel.	Office expenses, including rent.	Labor and materials.	Telegraph and postage.	Boat hire.	Total per month.
April	$220 00	$8 10	$27 47	$13 62	$0 26	$50 00	$321 45
May	456 00	41 69	25 07	8 10	73	50 00	581 59
June	494 00	41 34	26 67	18 80	....	101 00	681 81
July	544 00	77 03	16 67	2 74	1 52	60 00	701 96
August	525 00	22 55	16 67	....	79	32 00	597 51
September	539 00	42 12	21 12	2 58	50	....	609 32
October	390 50	29 21	16 67	2 45	50	20 50	459 83
November	304 50	....	....	....	....	....	304 50
Total							$4,257 97

TABLE SHOWING DATES OF SURVEY, LOCATION OF WORK, ENGINEER'S ESTIMATES, QUANTITIES OF MATERIAL REMOVED, CONTRACT PRICES, ETC.

Date of survey.	LOCATION OF SHOAL.	Engineer's estimates	Date of letting.	Contractor.	Contract price.	Material removed.	Date of completion.	Amount of final payment.
		Cubic yds.			Cents.	Cubic yds.		
May 8	Bath shoal	8,000	May 10	P. W. Myres	14	12,029	June 21	$1,684 06
May 5	Upper railroad bridge, Albany	4,000	May 10	P. W. Myres	14		June 21	
May 13	Easterly channel at Stuyvesant	37,000	May 31	E. M. Payne & Co	15 8-9	32,375	Sept. 30	5,144 02
May 17	Westerly channel at Coeymans	22,000	June 20	P. W. Myres	9 3-4	26,276	July 30	2,561 91
June 3	Dumping ground at overslaugh dyke No 2	8,000	....	Superintendent Public Works	....	26,266	Aug. 6	6,550 48
June 13	Upper side-cut, West Troy	7,000	....	Superintendent Public Works	....			
June 15	Washington bar	17,000	Sept. 20	P. W. Myres	32	15,184	Oct. 1	4,858 88
June 29	Upper railroad bridge, Troy	10,000	Sept. 20	P. W. Myres	32	11,479	Nov. 26	3,673 28
Aug. 9	New Baltimore bar	12,000	....	Not let	....	....	....	....
Aug. 30	Westerly channel at Coxsackie	34,500	Sept. 20	E M. Payne & Co	34	20,523	Nov. 1	6,977 82
Nov. 1	Repairing and raising Mull's dyke	*1,600 lin. ft.	....	R. Hamilton	....	....	Dec. 1	500 00

---

* Docking.

REPORT

OF THE

STATE ENGINEER AND SURVEYOR

ON THE

Condition of the Abandoned Chemung Canal and the Chemung Canal Feeder.

REPORT.

Office of the State Engineer and Surveyor,
Albany, N. Y., *April* 19, 1893.

To the Honorable the Assembly of the State of New York:

In obedience to the provisions of chapter 435, Laws of 1892, I would respectfully submit the following report:

I have obtained from the office of the Superintendent of Public Works copies of all releases filed in his office (194 in number) and have located and platted same upon the maps which accompany this report; released lands being thereon distinguished by a "red tint."

The fee of a few of these parcels of land has passed from the State by virtue of a moneyed consideration and deed in pursuance of the provisions of chapter 404, Laws of 1877, and 344, Laws of 1878, but in a great majority of cases the fee has passed out of the State by virtue of an acceptance and release, made in pursuance of the provisions of chapter 422, Laws of 1888, and written upon a form, of which the accompanying blank is a sample.

For the purpose of making the survey required by the statute, I detailed to this work, in August, 1892, an engineering party under the charge of Assistant Engineer John R. Kaley, and I herewith submit his report in relation thereto.

As already noted, the releases shown on the map cover only a small proportion of this canal and feeder, and that for by far the greater portion of this canal and feeder the title of the property still vests in the State.

The report of Mr. Kaley, hereto annexed, gives a statement in detail of all alleged nuisances or damages to property for which, in my opinion, any claim can be made entailing any responsibility therefor upon the State. In all of the cases noted, whatever public nuisances or damages to private property exist are caused by the failure of the State authorities to carry out the provisions of section 10 of chapter 404 of the Laws of 1877, which provides that, "It shall be the duty of the said commissioner or superintendent * * * to restore the streams to their original channels and to take suitable measures to prevent the flow of the water thereof into the prisms of the abandoned canal." No blame, however, can be attached to the State authorities for failure to literally carry out the provisions of this section. A strict compliance with its terms would necessitate the filling up of the entire prism of the canal and the opening through valuable farming lands and villages of old water-courses which have been entirely obliterated. It is hardly to be presumed that the framers of this law intended to direct any such course, and it is certain that the large amount of money required to pursue this course has never been appropriated. It is therefore claimed, and I think justly, that since it has been impossible to strictly comply with the provisions of this statute, the obligation rests upon the State to so control the flow of water in that portion of the bed of this canal and feeder to which the State still holds the fee as to avoid the creation of nuisances detrimental to the public health and unnecessary injuries to private property. The Chemung canal and feeder was built in 1830 and 1831, and was abandoned in 1878. It lies for a considerable portion of its distance at the bases of ranges of hills, and in its construction many streams were intercepted and diverted into its channel. During the period of its existence as a navigable channel the old beds of streams, lying between the canal and the adjacent creeks and rivers, were practically dried up and the old water courses obliterated either by agricultural or building operations. Since the time of the abandonment, numerous applications have been made to the Legislature to provide funds for properly diverting or controlling water flowing through the abandoned channels, with a result that, between the years 1881 and 1891, appropriations for this purpose have footed up the sum of $70,000. Much of this work has been effective and valuable and there now remains, in my opinion, in order to fully discharge the obligations resting upon the State, only the few and comparatively inexpensive improvements mentioned in detail in Mr. Kaley's report.

It will be seen from this report that there are six points upon the Chemung canal and four upon the Chemung canal feeder to which your attention is directed. I am not, however, at all clear that any obligation rests upon the State to abate nuisance No. 1 on the Chemung canal, treated of by Mr. Kaley, lying between lock No. 48 and the northerly boundary line of the city of Elmira.

In pursuance of the provisions of chapter 404 of the Laws of 1877 and 344 of the Laws of 1878, the State deeded to the "Canal Railroad Company" (a copy of which deed is herewith submitted) all of its title and interests in "that portion of the Chemung canal extending from the city of Elmira to the interception of the Utica, Ithaca and Elmira railroad at Horseheads, of a uniform width of sixty-six feet extending from the front angle of the towing path across the prism of the canal and berme bank, except on the curves when the whole width is included as covered by the blue line and extending to the blue line on the towing-path side in all cases." It seems to me that by this deed not only all of the benefits enjoyed by the State in this property but all of its obligations also were transferred to this corporation and that no liability rests upon the State to abate this nuisance, which is an offensive one, except in the exercise of its police powers to compel the present owners to so control and discharge these waters as to prevent the detriment to public health and injury to private property which now unquestionably exists here. The questions arising here have already received the attention of the State Board of Health and its views on the subject can be found on pages 216 to 222 of its annual report, transmitted to the Governor, April 9, 1885. I approve the plan recommended by Mr. Kaley for abating the nuisance and believe that the parties aggrieved can obtain a remedy at law compelling through the intervention of either the local or State Board of Health the Elmira, Cortland and Northern Railroad Company (the successors of the Canal Railroad Company) to abate the nuisance complained of in the manner here recommended. The fact that the State still owns a narrow strip of land along some portions of this part of the abandoned canal, should not, I think, relieve the railroad company from its liabilities. This railroad corporation is now in substantial enjoyment of all the rights which the State formerly possessed and the small strip of land to which the State still retains title is absolutely valueless and not in any way conductive to the maintenance of this nuisance.

Concerning nuisance No. 2, noted in Mr. Kaley's report, namely, that portion of the Chemung canal lying between the feeder, at Horseheads and lock No. 44, at Pine Valley, the canal here runs for a distance of about four miles at the foot of a range of hills. Drainage from these hills originally passed into Catherine creek, but as the level of the bottom of the canal prism is, until we reach lock No. 44, below that of water surface in Catherine creek, it is necessary, unless the whole prism of the canal be filled up, to carry the water coming from these hills and from springs in Horseheads in the prism of the canal. Owing to the small amount of fall in the canal prism and the small amount of water entering it during the heated season of the year, this prism becomes a stagnant cesspool. In several places along this portion of the canal, where it is crossed by farm roads, culverts of insufficient size have been built, and as a consequence in times of flood water is backed up and the canal prism overflows its banks and causes some damage to private property. I am of the opinion that the improvements recommended in Mr. Kaley's report should be made at the cost of the State. In some detached place along the four miles, now under consideration, releases have been signed and the title therefor vested in adjoining property owners. It might be equitable to insist upon payment by these individuals of an amount proportional between the toal cost of the work and the extent of these released portions.

Concerning the other four nuisances noted in Mr. Kaley's report, I am of the opinion that they should be abated at the cost to the State in the manner suggested by him and I would also advise that Mr. Kaley's recommendations for abating nuisances and avoiding damages to private property in the four cases noted on the Chemung canal feeder be adopted.

My investigation in this matter have developed the fact that, for a considerable portion of the Chemung canal feeder, the prism and banks of the canal are used as a road-bed for the Delaware, Lackawanna and Western Railroad Company, while I have been unable to discover any records giving this corporation the right to thus occupy State property and would recommend the taking of such action at law as may be necessary to compel this corporation to pay into the State treasury a reasonable compensation for the rights it is now enjoying. All of which is respectfully submitted.

M. SCHENCK,
State Engineer and Surveyor.

COPY.

THE PEOPLE OF THE STATE OF NEW YORK *against* THE CANAL RAILROAD COMPANY OF ELMIRA.

The People of the State of New York, by the Grace of God, Free and Independent, to all to whom these presents shall come, Greeting:

Whereas, As the Superintendent of Public Works of the State of New York has sold to the Canal Railroad Company of Elmira, N. Y., certain portions of the Chemung canal pursuant to the provisions of chapter 404, of the Laws of 1877 and chapter 344 of the Laws of 1878, and

Whereas, Such sale has been approved by the canal board by resolution, adopted March 20, 1880, as follows:

Resolved, That the sale by the Superintendent of Public Works to the Canal Railroad Company for railroad purposes of that portion of the Chemung canal extending from the city of Elmira to the intersection of the Utica, Ithaca and Elmira railroad at Horseheads of the uniform width of sixty-two feet extending from the front angle of the towing path across the prism of the canal and berme bank, except on the curves when the whole width is included as covered by the blue line and extended to the blue line on the towing-path side in all cases be approved.

Now, therefore, know ye that we, in consideration of the premises and the payment of six hundred dollars ($600), the receipt whereof is hereby acknowledged, have granted, bargained and sold, and by these presents do grant, bargain and sell, unto the Canal Railroad Company, aforesaid, all the right, title and interest which the State of New York has in and to the premises so sold by said Superintendent of Public Works, aforesaid, to said Canal Railroad Company mentioned and described in the resolution above set forth.

Together with all and singular, the rights, hereditaments and appurtenances to the same belonging or in anywise appertaining excepting and reserving to ourselves all gold and silver mines, also excepting such part or parts of said premises as may have been sold for taxes by the proper officer and which have not been or shall not be redeemed within the time limited for that purpose by law, and the title to which shall not have been subsequently acquired by us.

It being expressly understood that this conveyance is made subject to any and all provisions in said acts operating as a limitation upon the rights of said Superintendent of Public Works to sell any portion of said premises.

To have and to hold the above described and granted premises unto the said Canal Railroad Company, its successors and assigns, as a good and indefeasable estate of inheritance forever upon conditions, nevertheless, that our said grantee, its successors and assigns, shall pay and satisfy all taxes that may have been assessed on the above granted premises.

In testimony whereof, we have caused these our letters to be made patent and the great seal of our said State to be hereunto affixed.

Witness, Alonzo B. Cornell, Governor of our said State at our city of Albany, the 12th day of November, A. D., 1880.

(S) ALONZO B. CORNELL.

Passed the secretary's office November 12, 1880. Recorded April 8, 1881, 5.45 p. m.

ANSON S. WOOD,
Deputy Secretary of State.

THOS. G. SMITH,
Clerk.

This indenture of acceptance and release, made this.......... day of ....18.., by and between ....of the .... of .... county of ....and State of New York, part of the first part and the people of the State of New York, party of the second part,

Witnesseth: Whereas, by an act, passed June 10, 1881, known as chapter 482 of the Laws of 1881, all the estate, right, title, interest and property which the party of the second part theretofore acquired and then had in and to certain lands and water privileges, taken and appropriated for the purpose of constructing and operating the Chemung canal and Chemung canal feeder, is released and granted to, and made to revert to and vest in the person or persons owning the lands adjoining to the center of the prism of the said canal, upon certain considerations and conditions precedent in said act mentioned and provided.

And, whereas, the said part of the first part, the owner of certain lands in the..............of ....in the county of ...., lying adjacent to the said canal, ...and the lands so taken and appropriated for constructing and operating the same, and adjoining the same on ....side thereof, which said adjoining lands are described as follows, to wit: All that tract or parcel of land, situated in the.............of.............. county of ....and State of New York, ...

Now, therefore, The said party of the first part, in consideration of the premises and of such release and grant by the party of the second part, do release and forever discharge the State of New York, and the party of the second part, their and each of their officers, successors and assigns, from all obligations to maintain the bridges and other structures connected with said canal and feeder, or with any portion or portions thereof, or of either thereof, and from all and all manner of liability for damages arising from the abandonment thereof, and of and from all claims and demands of whatsoever kind or nature, which said party of the first part ever had or now has or which he or h heirs, executors, administrators or assigns can, may or shall have by reason of any of such obligation or liability. And said part of the first part, for .... h heirs, executors and assigns, hereby accept such release and grant so by the party of the second part made by said act, and the terms and conditions thereof, to the end that they and each of them, may hold, grant, devise and convey the lands thereby released and granted, and hereby accepted as in and by said act provided.

In witness whereof, The part of the first part ha hereunto set h hand and seal the day and year first above written.

.... [L. S.]
.... [L. S.]

STATE OF NEW YORK, } ss:
COUNTY OF............ }

On this .... day of .... 18 ., before me, the subscriber personally appeared.................... to me known to be the same person described in and who executed the foregoing instrument, and...............acknowledged that h executed the same.

STATE OF NEW YORK, } ss:
COUNTY CLERK'S OFFICE. }

I,......................., clerk of said county, and of the courts of record thereof, do hereby certify that ....Esq., whose name is subscribed to the foregoing certificate of proof or acknowledgment, or the annexed instrument, was at the date thereof a .... in and for said county, duly authorized and qualified to take the same; that I am well acquainted with his handwriting, and verily believe that said signature is genuine, and that said instrument is executed and acknowledged according to the laws of this State.

In testimony whereof, I have hereunto set my hand and affixed the seal of said county and courts at .... this .... day of ....18...

....
Clerk.

Report of John R. Kaley.

ALBANY, N. Y., *March* 14, 1893.

HON. MARTIN SCHENCK, *State Engineer and Surveyor:*

Dear Sir.— I submit the following report of a survey and examination, made in obedience to your instructions, of the present condition of the abandoned Chemung canal and the Chemung canal feeder, pursuant to the provisions of chapter 435, Laws of 1892:

I have located all the released lands as described in the releases on file in the office of the Superintendent of Public Works and have delineated said lands on a copy of the map of the Chemung canal, said original map being on file in the office of the State Comptroller.

I have also made an examination and surveys of all alleged existing nuisances on the Chemung canal and Chemung canal feeder and have made maps and profiles showing the extent and condition of said nuisances and submit recommendations with plans and estimates for abating the same.

The existing nuisances for the most part cause damage to lands, from overflow, rather than to health.

Released lands.

Releases filed in pursuance of the provisions of chapter 482, Laws of 1881, representing 194 parcels of land, were obtained from the Superintendent of Public Works. Fifty-six described lands on the feeder and 138 on the canal.

In addition to the above I have surveyed and placed on the map the following lands claimed by the owners to have been released:

H. S. Personious, at Millport, on the Chemung canal.

B. Edgar, at Gibson, on the Chemung canal feeder.

Much difficulty was met with in locating the lands as described in the releases furnished me. Old land marks on the line of the canal, such as structures, line fences, etc., have been destroyed or changed. In many localities the canal had been changed and the old banks destroyed.

The location of many of the boundary lines, and titles to much of the land, will be found to be in dispute. Many errors in chaining or in the platting of the original canal map were discovered. The descriptions as given by many of the releases were found to be incorrect. In some cases three and four different persons had given a release for the same piece of land and the land described in some releases would be found to lap over and include a greater part of that described in others.

Inasmuch as it has been found difficult and uncertain to locate the released lands, owing to incorrect descriptions, etc., it would be proper for the protection of the State, and to prevent disputes among land owners, to provide that in the future each application for a release be accompanied by a correct description and a copy of a portion of the State canal map, on which should be located the boundaries of the lands desired to be released, with a correct description of the same.

Thirty-two releases describe lands located in the city of Elmira, extending from the Junction canal near Washington street, southerly to Water street. I found these releases to be void, from the fact that this portion of the canal, known as State street, in pursuance of provisions of chapter 171, Laws of 1878, became the property of the city of Elmira. The property owners believed that it reverted back to them, and having made a test case as to title the Court of Appeals, sometime in 1892, declared the title to be vested in the city of Elmira.

The following releases in the city of Elmira were found to be void:

	No.
Peter Biggs	264
Fanny T. Loring	595
Frank Hiscock and Lucius Gleason	306
Jeremiah J. O'Connor	285
Pauline W. Turner	263
Francis Collingwood	297

	No.
Nathaniel R. Seeley and John C. Seeley	597
Abraham D. Slosson and A. M. DeWitt	267
Solomon L. Gillett and Helen B. Turner	598
Thomas Gerity	262
Geo. J. Magee and others, trustees Magee estate	295
John Davis Baldwin	266
Thomas Gerity and Geo. W. French	307
Elizabeth Coddington	289
Daniel Stephens and Frederick C. Steele	257
Wm. J. Dounce	288
Michael Casey	287
Adam Mander	375
Geo. S. McCann	316
Emma Baumeister and Elizabeth Martin	368
Ebenezer S. Lindsey	265
Eugene Diven	349
Wm. N. Estabrook	559
H. M. Partridge	348
Andrew Langdon	269
Theodore and Myer Friendly	560
John Biggs	310
Alex. B. and Wm. P. Turnbull	596
Avilla F. Watson	309
Henry C. Spaulding	374
John T. Rathbun and Newton T. Fassett, executors of Simeon Benjamin	291
New York, Lake Erie and Western Railroad Company	356

The State of New York sold to the Canal Railroad Company, of Elmira, pursuant to the provision of chapter 404, Laws of 1877, and chapter 344, Laws of 1878, that portion of the Chemung canal extending from the city of Elmira to the intersection of the Utica, Ithaca and Elmira railroad at Horseheads — of the uniform width of sixty-six feet, extending from the front angle of the towing path across the prism of the canal and berme bank, except on the curves where the whole width is included as covered by the blue line, and extending to the blue line on the towing-path side in all cases.

The sale was made by the Superintendent of Public Works, and was approved by the canal board March 20, 1888.

The deed is recorded in the county clerk's office, Chemung county, in book of deeds No. 75, page 69.

The railroad junction at Horseheads is at the junction of the Chemung canal and Chemung canal feeder. The Canal railroad is now controlled by the Elmira, Cortland and Northern Railroad Company. An inspection of the map will show that by the terms of the deed there are plats of land on this portion of the canal, not on curves, where the distance from the front angle of the towing path across the prism of the canal and berme bank exceeds sixty-six feet from three to thirty-three feet. These portions still belong to the State.

At the railroad junction in Horseheads, Rodburn and Reynolds' releases No. 427 "A" and No. 467 "B" include a part of the property sold to the railroad company.

The released lands are shown on the maps herewith submitted and are indicated by red tints. The names and numbers used are those that appear on the releases.

Nuisances existing on account of imperfect drainage upon the Chemung canal and Chemung canal feeder.

Nuisances were found to exist at the following places upon the Chemung canal and Chemung canal feeder:

Chemung canal.

No. 1. Between lock No. 48, near Gipsy lane and Grand Central avenue, near the northern boundary of the city of Elmira.

No. 2. From the junction of the feeder and canal at Horseheads to the south side of lock No. 44 at Pine Valley.

No. 3. Between new lock No. 35 and Hubbard Run creek, at the railroad trestle, Lower Pine Valley.

No. 4. At lock No. 26 in the village of Millport.

No. 5. At the culvert on the Havana level, between locks No. 1 and No. 2, Havana.

No. 6. At Mill creek, Havana, from Catherine creek to a point distant about 1,100 feet westerly; also in the chamber of lock No. 1, between the abandoned Mill creek aqueduct and Ayres street.

Chemung canal feeder.

No. 1. From the dam on the lands of Lewis Fitch, to the highway bridge crossing the canal adjoining the lands of George Wells.

No. 2. At Low's pond, on the lands of Cornelius Low, east of the village of Big Flats.

No. 3. On the lands of N. S. Mundy, Henry Botshire, W. B. Miller and others, in the town of Big Flats.

No. 4. On the lands of Haight, Goff and Gillett, opposite the East Corning railroad depot.

I found it impossible to locate places where streams had been intercepted and their original course changed by the construction of the canal, and for canal use, owing to the fact that the lands have been under cultivation for many years and the old channels filled up and can use only the evidence given by the State map.

The following tables show where the railroads cross and occupy canal lands released and not released, and also whether said roads affect the drainage of the prism of the canal and whether culverts run through the embankments at canal crossings.

Railroads and highways crossing canal and feeder on lands not released.

Number.	Canal or feeder.	Map number.	RAILROAD OR HIGHWAY.	Location on canal or feeder.	Culvert through embankment.	Does it hinder drainage of canal?
1	Canal	6	Northern Central railroad	South of lock No. 34	No	No.
2	Feeder	1	Highway, Hulett avenue	West of Horseheads	No	Yes.
3	"	2	" "	Farr's west line	Yes	Too high.
4	"	2	Delaware, Lackawanna and Western railroad	East end of Low's pond	No	Yes.
5	"	4	Haight's lane	West of Wm. Gillett's land	No	Yes.
6	"	4	Highway	East of Hiram Seymour's land	No	Yes.
7	"	5	Delaware, Lackawanna and Western railroad	East of Bloody Run creek	No	Yes.
8	"	5	" " " "	On lands of Stephen Gorton	No	Yes.
9	"	5	" " " "	At Gibson, east and west of guard-lock	No	No.

Railroads and highways affecting drainage of the canal and aiding to maintain nuisances.

Number.	Canal or feeder.	Map number.	RAILROAD OR HIGHWAY.	Location on canal or feeder.	Culvert through embankment.	Portions affected in drainage.
1	Canal	1	Grand Central avenue	South of Eldridge Park lake outlet	No	Gen Diven.
2	"	1	Elmira, Cortland and Northern railroad	" " "	No	Gen. Diven.
3	"	1	" " "	North of Eldridge Park lake outlet	Too high. Yes.	Gen. Diven.
4	"	2	" " "	South of lock No, 48	Too high. Yes.	Lock 48.
5	"	2	Highway, Gypsey lane	" "	Too high. Yes.	Lock 48.

Railroads crossing canal and feeder on lands released and not released, which do not affect drainag and do not aid in maintaining nuisances.

Number.	Canal or feeder.	Map number.	RAILROAD OR HIGHWAY.	Location on canal or feeder.	Culvert through embankment.	Whether there is a culvert through roadbed.
1	Canal	3	Elmira, Cortland and Northern railroad	At junction at Horseheads		Yes.
2	Feeder	1	Northern Central railroad	At lock No. 50, Horseheads		Yes.
3	"	1	Delaware, Lackawanna and Western railroad	At town line, West Horseheads		Yes.

Description of nuisance.

Chemung canal.

No. 1. Between lock 48 and Grand Central avenue.

The prism of the canal receives the waters discharged from springs in the chamber of lock No. 48, from the outlet of Eldridge Park lake, from a creek at McConnell's road, which conveys the water discharged from the pumping station at North Elmira and from the ditch dug by the State leading from the canal near lock No. 45 and known as Sayres' ditch.

The State canal map shows a stream passing through a culvert under the canal at Newtown creek. This stream is known as Holderman creek. I am informed that the course of this stream was changed by the Erie railroad embankment, it now empties into the Eldridge Park lake, and also that the canal intercepted the outlet of Eldridge Park lake which, as shown upon the map, empties into the canal. It was afterwards carried under the canal through a culvert; this culvert is stopped up, probably broken in, and the water now discharges into the canal as shown on the map.

For the following reasons it is now impossible to drain this portion of the canal:

The pipe culvert through the highway known as Gipsy lane is too small.

The pipe culvert through the Elmira, Cortland and Northern railroad embankment, crossing the canal just south of Gipsy lane, is too small.

The pipe culvert, discharging into General A. Diven's ditch, through the Elmira, Cortland and Northern railroad embankment (the old towing path), is too small and too high.

Near Grand Central avenue the Elmira, Cortland and Northern railroad embankment crosses the canal, forming a basin in the prism with no outlet.

Just south of Grand Central avenue a basin, with no outlet, is formed by the Grand Central avenue embankment crossing the canal.

The water in Newtown creek is backed up to and above the discharge end of Diven's ditch by the Clinton woolen mill dam near Fifth street, in the city of Elmira, so that the fall from the surface water in the canal to the surface water in Newtown creek was, as found by me in September, 1892, three feet and six inches. The length of the discharge (Gen. Diven's ditch) is about 2,700 feet.

The discharge through Diven's ditch is very much retarded by bends and windings after leaving Gen. Diven's house grounds.

Obligations of the State and others to abate the nuisance.

The State.

Under chapter 404, Laws of 1887, section 10, the State is called upon to restore streams to their original channels, which had been interrupted and prevent the flow of water thereof into the prisms of the abandoned canals, etc.

When the Canal Railroad Company of Elmira purchased this portion of the canal lands the entire width between the blue lines was not included in the purchase. (See remarks on the transfer on a preceding page.)

I am of the opinion that the State is under obligations to place Gen. Diven's ditch in a condition to discharge the water from the canal, from the fact that the water of Eldridge Park lake is shown by the State canal map to discharge into the canal and also that this liability on the part of the State also exists in removing the Clinton woolen mill dam at Fifth street in order to increase the grade of the ditch.

The water from Eldridge Park lake formerly discharged through a culvert under the canal, although this culvert does not show on the State canal map, but it now flows into the prism, owing to the culvert masonry being broken or the passageway stopped up.

The town of Horseheads.

The Gipsy lane culvert being on a town highway the town should rebuild the culvert to a proper size and grade.

Elmira, Cortland and Northern railroad.

This railroad owning most of the abandoned canal on which the nuisance exists should be compelled to rebuild, to a proper size and grade, the culverts through its road-bed and pay a just proportion, about nine-tenths, of the expense of filling the prism of the canal to a grade sufficient to prevent the water becoming stagnant, as provided for in the plans accompanying this report for abating the nuisance.

The Reformatory sewer, which enters the canal prism some distance south of Grand Central avenue, can not be utilized to drain this portion of the canal, as the elevation of the bottom of the sewer at the manhole, 2,000 feet south of Grand Central avenue, is 100 x 20, or 3 6-10 feet above the lowest spot found in the canal prism.

Proposed plan for abating the nuisance.

I would recommend that the prism of the canal from lock No. 48 to just south of Grand Central avenue be filled to the grade as shown on the nuisance map accompanying this report.

That the present culvert be replaced by open stone culverts of eight-foot span; that Diven's ditch from the canal to Newtown creek be deepened and straightened to the grade shown on plan, and that the Clinton woolen mill dam, near Fifth street, be removed to the foundation and the bed of Newtown creek be excavated to a depth of about two feet for a distance of 500 feet from the new outlet of Diven's ditch.

The following table will show a comparison of heights of different points on the canal, creek, etc., as they now are and are to be by the plan proposed for abating the nuisance:

LOCALITY.	Distance in feet.	Present elevation.	Proposed elevation.
Elevation of lowest point at lock 48	....	96.60	99.00
Elevation of lowest point in canal — Lock 48 to Grand Central avenue	3,500	96.40	....
Elevation of water surface in canal prism	....	99.00	....
Elevation of canal at Gen. Diven's ditch	....	97.50	97.50
Elevation of railroad culvert at Diven's ditch	....	98.50	97.50
Elevation of water surface Eldridge Park lake	....	99.80	....
Elevation of foundation of highway culvert at Gen. Diven's house	*700	96.30	96.30
Elevation of present outlet at Diven's ditch at Newtown creek	*2,712	94.40	....
Elevation of present water surface Newtown creek at Diven's ditch	*2,712	95.40	....
Elevation new outlet of Diven's ditch at Newtown creek	*2,264	94.80	93.20
Elevation of bed of Newtown creek 500 feet south of new outlet	*2,857	92.00	92.00
Elevation of crest of Clinton woolen mill dam	....	95.00	88.70
Elevation of bottom of Reformatory sewer at manhole 2,000 feet south of Grand Central avenue	....	100.20	....
Length of Newtown creek from present mouth of Diven's ditch to the Clinton woolen mill dam	10,000	....	....

* From canal.

By straightening Diven's ditch as shown on the map the length will be shortened 448 feet.

The following estimates show the cost of abating the nuisance on the proposed plan.

The first estimate shows the total cost of the work and the second the cost to the State, should the town of Horseheads rebuild the culvert at Gipsy lane and the Elmira, Cortland and Northern railroad build the culverts at their crossings and pay for nine-tenths of the canal filling:

Estimate of total cost.

Quantities.	ITEMS.	Price.	Amount.
1	Bailing and draining	$150 00	$150 00
1	Partially removing Clinton woolen mill dam.	100 00	100 00
1	Water privilege at Clinton woolen mill dam.	3,000 00	3,000 00
7,760	Cubic yards embankment	15	1,164 00
7,900	Cubic yards ditch excavation	20	1,580 00
640	Cubic yards culvert foundation excavation	25	160 00
130	Cubic yards rubble masonry in cement for culverts	6 00	780 00
15	Cubic yards concrete	6 00	90 00
13,000	Feet B. M. hemlock timber and plank	18 00	234 00
1,000	Feet B. M. white oak	35 00	35 00
	Spikes and nails	....	15 00
	Total	....	$7,308 00

Estimate of cost to the State if the railroad and town pay for their proportion of the work.

Quantities.	ITEMS.	Price.	Amount.
1	Bailing and draining	$25 00	$25 00
1	Partially removing Clinton woolen mill dam.	100 00	100 00
1	Water privilege at Clinton woolen mill dam.	3,000 00	3,000 00
780	Cubic yards embankment	15	117 00
7,900	Cubic yards excavation for ditch	20	1,580 00
	Total	....	$4,822 00

I am informed by members of General Diven's family that there will be no land damages for the proposed change of the ditch leading from the canal to Newtown creek, the land being owned by the family.

Should the water privilege at the Clinton woolen mill cost more than $3,000 the excess would be paid by citizens interested in the improvement.

No. 2. From the junction of the Chemung canal and Chemung canal feeder at Horseheads to the south side of lock No. 44 at Pine Valley.

This portion of the canal prism, located on the summit level, holds a large amount of water which flows from springs and from the high ground on the west side of the canal. The current is not sufficient to prevent the growth of a large amount of vegetation in the prism. The flow is retarded by many bars, caused by land owners locating celery wash-houses in the prism of the canal, and several small culverts located at farm crossings. The water on this level flows in two directions from a summit located about one mile north of Horseheads, on the north line of the Westlake property. That portion flowing to the southward empties into a sewer constructed by the State, under chapter 105, Laws of 1884, at the junction of the canal and feeder at Horseheads, thence into Newtown creek. That portion flowing from the summit northwardly leaves the canal just south of lock 44 and empties into Catherine creek, on the lands of Richard Dillmore.

At times of high water the flow in the prism is not sufficient to discharge the water, on account of the bars and contracted openings in the culverts, and it overflows the banks.

The State canal map shows several streams intercepted by the canal between Horseheads and the lands of Alfred Wheat.

The following table shows the location of the obstructions in the prism of the canal, and the distance of each from the junction of the canal and feeder at Horseheads.

Some of the culverts were built by the State.

DESCRIPTION.	Distance in feet from the junction.
Culvert on Richard Wilcox land, release No. 292	9,800
Culvert on lands of John Dean, not released, and on Chemung railroad, release No. 423 "A"	11,878
Culvert on Thomas Ward's land, not released	14,780
Culvert on Kate Eagan's land, release No. 561	20,510

DESCRIPTION.	Distance in feet from the junction.
Wash-house, at culvert on B. Westlake's land, release No. 293	2,450
Wash-house, on Archibald Donald's land, release No. 359	4,722
Wash-house, owned by James Cromwell, lands not released	6,300
Wash-house, on lands formerly owned by Darius Bently, not released	6,900
Wash-house, on lands of John Deane, not released	12,318

Obligations of the State and others to abate the nuisance.

The State.

Under act, chapter 404, Laws of 1877, the State should restore streams to their natural channel.

The State still owns a large part of the abandoned canal lands between Horseheads and Pine Valley.

Adjoining land owners who have released the State.

The following is a list of the releases on this portion of the canal, and I see no reason why said released lands should not bear their just proportion of the cost of abating the nuisance:

Side of canal.	Distance in feet from junction.	PROPERTY OWNER.	Number of release.
Berme		H. F. Rockwell	567
"	300	W. E. Haines	584
"	500	C. P. Boetaker	566
Towpath		A. C. McCumber	609
Both	600	B. Westlake	293
Towpath	3,700	Archibald Donald	359
Both	8,700	Richard Wilcox	292
Berme	11,850	Chemung Railroad Company	423 "A"
"	13,250	" " "	423 "B"
"	13,400	" " "	424
"	14,100	" " "	425
"	15,000	" " "	426
"	15,250	" " "	427
"	15,800	" " "	428
"	15,950	" " "	429 "A"
Towpath	16,300	" " "	429 "B"
Berme	16,500	" " "	430
"	18,000	" " "	431
Towpath	18,000	Alfred Wheat	406
Both	20,100	Kate Eagan	561

Proposed plan for abating the nuisance.

I would recommend that the prism of the canal be filled and excavated, as shown on the accompanying nuisance map and profile, to the grades shown, so as to divide the flow of water at the summit similar to its present flow, and that the culverts be rebuilt and celery wash-houses removed; all of which are located and described in the preceding table.

The culverts should be constructed of rubble masonry in cement with a clear span of ten feet.

In excavation, the bottom of the prism to be four feet wide at grade with side slopes one and one-half to one.

Table showing elevations of proposed new grade for prism and distances from the canal and feeder junction at Horseheads:

	LOCATION.	Proposed elevation.
0.0	At State culvert junction at Horseheads	883.80
3,900	At summit on W. W. Westlake's north line	887.00
22,700	Just south of lock 44, Pine Valley	880.80

During the year 1888 the State, under the direction of the Superintendent of Public Works, expended a large amount of a $10,000 appropriation, by chapter 470, Laws of 1885, for draining this portion of the abandoned Chemung canal.

Estimate of cost for draining the prism of the abandoned Chemung canal from the junction of the feeder and canal at Horseheads to the south end of lock No. 44:

Quantities.	ITEMS.	Price.	Amount.
1	Bailing and draining and coffer dams	$500 00	$500 00
8,780	Cubic yards earth excavation	30	2,634 00
80	Cubic yards loose rock	1 00	80 00
1,640	Cubic yards embankment	15	246 00
72	Cubic yards rubble masonry in cement	6 00	432 00
3,000	Feet B. M. white pine timber	35 00	105 00
1,800	Feet B. M. oak plank	35 00	63 00
6,500	Feet B. M. hemlock timber and plank	18 00	117 00
	Total	....	$4,177 00

Nuisance No. 3, between new lock No. 35 and Hubbard Run creek, at the railroad trestle, Lower Pine Valley.

This portion of the abandoned canal forms a large basin, which receives and holds water discharged from springs and the surface of quite a large area of territory on the west side of the canal. Hubbard Run creek formerly drained this part of the canal, but will not do so now, owing to the fact that both its channel, and that of Catherine creek into which it empties, have been filled by material washed and carried from the surrounding lands.

There is a small wooden box drain leading from the north end of the basin to Catherine creek, but it is useless being too low at both ends.

Obligations of the State to abate the nuisance.

This portion of the canal is not released. Hubbard run was formerly intercepted by the canal and emptied into it on the west side — there being a waste-weir on the towing-path side directly opposite. Inasmuch as streams, channels and ditches leading from waste-weirs, waste-gates, culverts and aqueducts, though not included within the blue lines, were appropriated by the State as drains to such waste-weirs, gates, culverts and aqueducts, and were kept in condition to carry off said drainage, I am of the opinion that the State should drain the basin, either by excavating the beds of Hubbard run and Catherine creek to the proper level or by filling in the prism of the canal to a proper height to give the required fall to Catherine creek.

Proposed plan for abating the nuisance.

I would recommend that the prism of the canal be filled up to the grade shown on the accompanying map and profile between the upper end of new lock No. 35 and Hubbard Run creek and that a ten-inch vitrified pipe be laid from the lower end of the fill to Catherine creek. This culvert to be located at Sta. Ox 280, as shown on the map.

The elevations of the several points are shown in the following table, also distances of each from the proposed new culvert.

Distance in feet.	LOCALITY.	Present elevation.	Proposed elevation.
360	Upper end of fill in upper end lock 35	....	99.00
0	Proposed culvert at upper end Sta. Ox 280	....	97.00
75	Proposed culvert lower end at Catherine creek	....	95.30
79	Hubbard Run creek bed	98.60	....
31	Old box drain, south end basin	94.00	....
144	Catherine creek bed, junction with Hubbard run	94.70	....
295	Water surface Catherine creek at new culvert	95.70	....

Estimated cost for draining the prism of the canal between the upper end of lock No. 35 and Hubbard Run creek:

Quantities.	ITEMS.	Price.	Amount.
80	Cubic yards earth excavation	$0 20	$6 00
680	Cubic yards embankment	20	136 00
2	Cubic yards rubble masonry in cement	6 00	12 00
167	Feet B. M. hemlock timber and plank	18 00	3 00
76	Lineal feet vitrified 10-inch pipe laid	50	38 00
	Total	....	$195 00

The Northern Central railroad is located on a trestle on the east side of the canal; the railroad company contemplates an improvement in the alignment of its line, and I have been informed that this would necessitate the occupation of part of the canal lands on which this nuisance exists, and that said railroad company would abate the nuisance at its own expense.

Nuisance No. 4, at Lock No. 26, in the village of Millport.

At this place there are two basins in the prism of the canal, the one in the chamber of the lock, the other between the lower end of the lock and the highway embankment, a short distance to the northward; both hold water which flows into the canal prism from the southward from springs and surface drainage.

The State placed a culvert two feet above the bottom of the canal at the lower end of the lock; it extends through the towing path and was intended to drain the water from the prism and discharge it into Catherine creek. At the time the work was under way the canal bottom was to be filled in to the elevation of the bottom of the culvert; this was done, as I am informed, because the amount of the appropriation laid aside for the work was insufficient. There is an abandoned culvert under the highway, but it can not be used on account of having no outlet, the canal prism being filled to the northward.

Obligations of the State and others to abate the nuisance.

The State.

The drainage is not affected by any streams intercepted by the canal. The State owns 231 lineal feet of the abandoned canal lands on the towing path and berme sides.

Adjoining property owners.

D. Thomas, release No. 804 "C," has released the State for about 125 lineal feet on the berme side and about sixty-three feet on the towing-path side.

Proposed plan of abating the nuisance.

I would recommend that both basins be filled to the grade shown on the accompanying map and profile, so that the water will flow to and through the present culvert through the towing path into Catherine creek.

Table showing elevations and distances:

Distance from culvert in feet.	LOCATION.	Present elevation.	Proposed elevation.
283	Upper end of fill	96.30	96.30
....	Bottom of culvert through towpath	92.80	92.80
42	Lower end of culvert through towpath	91.40	91.40
....	Lowest point in upper basin	90.80	....
....	Lowest point in lower basin	88.40	....

Estimated cost for abating the nuisance at lock No. 26, at Millport:

Quantities.	ITEMS.	Price.	Amount.
100	Cubic yards earth excavated	$0 20	$20 00
300	Cubic yards earth embankment	20	60 00
	Total	....	$80 00

Nuisance No. 5, on the Havana level, at the culvert between locks Nos. 1 and 2.

This culvert was built by the State to conduct under the canal to Catherine creek the waters from several streams and ditches from the west side. It has not for a long time performed its duty, on account of the filling up of the channel of Catherine creek for a long distance above and below the junction with the culvert outlet. It has a box culvert extension, about eighty-nine feet long on the east end, which was constructed by the State, and a three-foot by four-foot box extension, about 140 feet long on the west end, constructed by the Northern Central railroad under its road-bed.

The State culvert under the canal is a semi-circular stone arch of four-foot span, two-foot rise, with eighteen-inch bench walls; all the culverts are filled nearly full with deposit.

When the water in Catherine creek raises it flows back through the culverts and floods the land on the west side of the canal; these lands, owing to the clogged condition of these culverts, remain flooded for a long time after the water in the creek reaches its low stage. The outlet of the culvert to Catherine creek, a distance of 350 feet, forms a pond which becomes stagnant.

From the north side of the arch culvert to the north side of Mill creek, at the entrance to lock No. 1, a distance of about 2,500 feet, there is a twelve-inch vitrified pipe in the prism of the canal, placed there by the State for the purpose of draining the canal prism between locks Nos. 1 and 2. This pipe has a total fall of two and seven-tenths feet. At the head of lock No. 1 the pipe ends its discharge, passes through the chamber of the lock, thence through the Ayres street embankment into the lock level. The accompanying map and profile shows distances and elevations of the culverts and their connections.

Obligations of the State and others to abate the nuisance.

The State.

This portion of the canal is not released and belongs to the State. The State appropriated the outlet leading from the culvert and should keep said outlet and the culvert in a condition to carry off the water or provide some other means of drainage.

The Northern Central Railroad Company.

The culvert under the company's roadbed connecting with the State culvert is nearly filled with deposit and should be cleaned out at the expense of the railroad company. I am informed that this will be done.

The following table shows elevations and distances to different places, with the culvert and its discharge.

Distance in feet from inner angle of towing path.	LOCATION.	Present elevation	Proposed elevation.
0	Elevation bottom of culvert under canal	85.40	85.40
0	Elevation top of culvert inside under canal	88.90	88.90
30	Elevation bottom of canal	91.60	....
327	Elevation bottom ditch, west side of canal	92.50	92.50
219	Elevation bottom ditch, west end railroad culvert	91.00	91.00
107	Elevation bottom pond at discharge end of canal culvert.	91.30	....
107	Elevation low-water surface in pond at discharge end of culvert	92.30	....
444	Elevation low-water surface in Catherine creek, end of culvert discharge	91.60	....
444	Elevation bottom of Catherine creek, end of culvert discharge	91.60	....
4	Elevation south end twelve-inch pipe in canal prism	88.70	....
2,507	Elevation north end twelve-inch pipe in canal prism	86.00	....
2,507	Elevation Catherine creek low-water surface opposite lock 1.	87.10	....
2,507	Elevation Catherine creek bottom surface opposite lock 1.	85.30	....

Proposed plan for abating the nuisance at the culvert on Havana level, between locks Nos. 1 and 2.

The twelve-inch pipe in the prism of the canal, beginning at the arch culvert and ending at lock No. 1, has been found by trial to be of sufficient size to carry off the drainage in the prism from the south side of the arch culvert and from lands on the west side of the canal.

During the fall of 1892 an opening was made in the ring of the arch culvert, in the center of the canal. As soon as the opening was made it emptied the pond on the east side of the towing path and discharged the drainage from the west side of the towing path and discharged the drainage from the west side of the canal, the entire amount of water flowing into the twelve-inch pipe which conducted it to lock No. 1.

During the present year (1893) the water has been as high at this locality as at any time known, and the opening in the arch culvert and the twelve-inch pipe have done all the draining required in a satisfactory manner.

I would recommend that the opening in the arch culvert just east of the center of the canal be stopped up, the balance of the culverts to the westward cleaned out, an opening made in the ring of the arch culvert four feet by four feet, and that walls be built up around it from the bench walls of the culvert forming a well, and that the space between the walls and the berme and towing-path bank be filled in, forming a dam across the canal. An opening to be made in the south side of the well to receive the water flowing from the southward, and the twelve-inch pipe connected from the north side of the well to receive the waters from the southward and westward to carry them to lock No. 1.

There are two manholes connected with the twelve-inch pipe sewer, the tops of which are beneath the surface of the ground. I would recommend that these manholes be carried up to the elevations of the surface on either side of the canal.

Estimate of cost for abating nuisance at the culvert on the Havana level between locks Nos. 1 and 2.

Quantities.	ITEMS.	Price.	Amounts.
1	Cleaning out State culvert	$50 00	$50 00
2	Raising manholes on twelve-inch pipe sewer	25 00	25 00
15	Cubic yards embankment	20	3 00
12	Cubic yards rubble masonry in cement	6 00	72 00
	Total	....	$150 00

Nuisance No. 6.

At Mill creek, Havana, from Catherine creek to a distance of about 1,100 feet westerly, also between Mill creek and Ayres street.

Mill creek enters the village of Havana from the westward, opposite Main street; there it turns at right angles and flows northward in nearly a straight line for a distance of about 1,390 feet, where it deflects to the right, crossing the abandoned canal just south of lock No. 1, and empties into Catherine creek east of and opposite the lock.

From the 1,390 feet point to Catherine creek, a distance of 1,100 feet, the channel of the stream is obstructed by numerous bars which cause an overflow of the adjoining lands and also in times of low water affect the drainage of said lands.

This creek originally discharged into the lake level, about 400 feet below lock No. 1 (see State canal map), but its course was changed by the State, as shown by the accompanying map, from the 1,390 feet point so as to cause it to empty into Catherine creek above the lock. I am informed that this change was made some time between the years 1847 and 1849. The State canal map shows the creek to be State property from just opposite Main street to its outlet at the lake level below lock No. 1. It is inclosed by the canal blue lines, which call for a uniform width of sixty-six feet for the entire distance.

During 1885 and 1886 the State, under the direction of the Superintendent of Public Works cleaned the channel of Mill creek and placed an embankment across the abandoned canal at Ayres street, and placed two eighteen-inch pipes through the embankment for the purpose of draining the basin between Mill creek and Ayres street; the pipes were placed too high, so that when the lake level raises the water flows back into this basin and when the lake level reaches the low stage the basin holds water which becomes stagnant. This basin also receives the discharge from the twelve-inch pipe, which is described in nuisance No. 5, between locks No. 1 and No. 2. The nuisance map accompanying this report shows the location and elevations of the basins, culverts, etc.

Obligations of the State and others to abate the nuisance.

The State.

The creek is the property of the State. The State changed the original course of the stream. No release has been given for this land.

The canal lands upon which the nuisance exists, between Mill creek and lock No. 1, are not released.

The Northern Central Railroad Company.

This company crosses Mill creek close to the canal and should be compelled to clear their portion of the channel of Mill creek.

Proposed plan for abating the nuisance.

I would recommend that the channel of Mill creek be excavated to the grade shown on the accompanying map from a point 656 feet west of the canal to Catherine creek, which is 395 feet east of the canal, and that this excavated material be deposited in the basin between Mill creek and Ayres street, and that the twelve-inch pipe terminating at Mill creek be connected by a twelve-inch vitrified pipe with the eighteen-inch pipe in the Ayres street embankment. The material excavated from Mill creek will not fill the entire basin to the elevation of the adjoining ground on either side. To prevent any standing water in the proposed basin filling, a cesspool should be located in the center over the pipe culvert.

The following table shows elevations and distances of different points on the creek, basin, etc.:

Distance in feet from canal.	LOCALITY.	Present elevation.	Proposed elevation.
656	Elevation of west end of new grade, Mill creek......	93.70	93.00
395	Elevation of east end of new grade, Mill creek......	86.30	86.30
395	Elevation of water surface, Catherine creek.........	86.30	....
*0	Elevation bottom twelve-inch pipe culvert at Mill creek	86.40	86.40
*250	Elevation bottom of eighteen-inch pipe culvert at Ayres street..	86.00	86.00
*150	Elevation lowest point of basin between Mill creek and Ayres street..................................	80.60	89.00
*0	Elevation canal south side Mill creek	92.80	92.80

Estimate for abating the nuisance at Mill creek and the basin between Mill creek and Ayres street, at lock No. 1, Havana:

Quantities	ITEMS.	Price.	Amount.
1,680	Cubic yards earth excavation.........................	$0 40	$672 00
250	Lineal feet twelve-inch vitrified pipe	50	125 00
	Total..................	....	$797 00

Nuisances on the Chemung canal feeder.

Nuisance No. 1.

From the dam on the Lewis Fitch farm to the highway bridge crossing the canal on the lands of Geo. Wells.

This portion of the abandoned canal receives the waters discharged from numerous springs in the canal prism and from a large amount of the surface drainage flowing from the south side of the canal through a large box culvert constructed by the Erie railroad under its road-bed, and located 250 feet west of Fitch's west boundary line.

---

* Distance in feet from Mill creek.

Sing Sing creek, located on the north side of the canal, at times overflows its banks and the water crossing the Delaware, Lackawanna and Western railroad, just east of the highway bridge, reaches the prism of the canal. The greater number of the springs which supply the water are located just east of the highway bridge. At this bridge there is a summit in the canal from which a small amount of the water flows westerly emptying into Sing Sing creek through an abandoned aqueduct; about 5,000 feet west of the highway bridge the largest amount of water flows easterly down the canal for a distance of 8,060 feet to the town line between Big Flats and Horseheads where it disappears in a bed of gravel, and, as it is claimed by landowners Hulett, Sayres and Murphy, appears again on the low vegetable gardens, located respectively 8,930 feet and 9,820 feet east of the town line, and as it is claimed does great damage to these lands.

After the canal and feeder were abandoned the State built an earthen dam across the prism of the canal on the lands of Lewis Fitch, at a distance of 4,066 feet east of the highway bridge at George Wells; this dam was built for the purpose of turning the waters westerly to the abandoned aqueduct at Sing Sing creek and prevent the overflow of the low garden lands at Horseheads, and while this dam was intact it is claimed by Messrs. Hulett, Sayres and Murphy that all damages to their lands ceased. Several years after the dam was built Lewis Fitch claimed that it backed up and held water along his land, which became stagnant and produced sickness, and to remedy the evil he cut an opening through the dam allowing the water to flow toward Horseheads. Since that time Messrs. Hulett, Sayres and Murphy say that the condition of their garden lands is the same as before the construction of the dam. The dam would produce slack water eastward to the summit at the highway.

U of M

The bottom of the canal between the Fitch dam and the lands of Hulett, Sayres and Murphy is nearly level and is about twenty feet above the general level of the damaged lands of Sayres and Murphy.

The following table shows the highway and railroad crossings on the canal from opposite Mr. Murphy's property at Horseheads to the aqueduct at Sing Sing creek. It shows distances to each from Fitch dam and also other locations:

No.	Distance in feet from Fitch dam.	LOCALITY.
		EAST OF FITCH DAM.
1	11,495	Hulett avenue at Maple Grove Cemetery.
2	7,685	Highway between Delia Hadley and L. Hopkins.
3	3,795	Delaware, Lackawanna and Western railroad at town line.
4	3,230	Highway on Bennet property near town line.
5	670	Farm road on Sanders land.
		WEST OF FITCH DAM.
6	0.0	Fitch dam on lands of Lewis Fitch.
7	1,274	Farm road on Lewis Fitch lands.
8	2,644	Fitch west line.
9	2,894	Erie railroad culvert, south side canal.
10	3,624	Delaware, Lackawanna and Western railroad.
11	4,066	Highway at George Well's residence.
12	4,253	Delaware, Lackawanna and Western railway.
13	5,010	Crystal Spring Creamery.
14	6,306	Highway west of creamery.
15	8,983	Abandoned aqueduct, Sing Sing creek.

The embankments of Nos. 2, 3, 4, 5, 6, 7, 10, 11, 12 and 14 in the preceding table have culverts through them for draining the canal prism.

There is no culvert through No. 1, Hulett avenue, and if the water from the prism flowing from above the Fitch dam did not disappear through the gravel bed at the town line, as before described, it would be backed up by the Hulett avenue embankment and overflow the towpath bank of the canal and take a southerly course over the surface to Newtown creek. None of it would reach the low lands at Horseheads.

Table showing elevations of culverts through embankments as described in preceding table and also elevations of canal bottom, tops of highway embankment, etc.

No.	Distance from Fitch dam in feet.	DESCRIPTION.	Elevation.
		EAST OF FITCH DAM	
	12,920 and 13,810	Low lands of Sayres and Murphy, Horseheads	About 78.00
	12,920 and 13,810	Canal bottom opposite Sayres and Murphy, Horseheads......	About 98.00
1	14,495	Hulett avenue, canal bottom........................	About 78.00
1	14,495	Hulett avenue, top highway on canal..............	About 85.50
		WEST OF FITCH DAM.	
6		Fitch dam, canal bottom....	97.60
6		Top of Fitch dam	106.50
6		Water service in canal above Fitch dam...........	100.10
7	1,274	Fitch farm road, bottom culvert....................	98.40
7	1,274	Fitch farm road, top of road........................	104.40
8	2,644	Fitch west line, canal bottom	98.40
9	2,894	Erie railroad culvert	101.80
10	3,634	Delaware, Lacka. and Western railroad culvert ...	99.40 and 99.60
10	3,624	Canal bottom at railroad culvert..................	99.04 and 98.90
10	3,624	Water surface at railroad culvert..................	100.20 and 100.60
11	4,064	Highway culvert on summit at Geo. Wells	99.50
11	4,064	Canal bottom on summit at Geo. Wells...........	99.00 and 98.50
11	4,064	Water surface on summit at Geo. Wells	100.70 and 100.00
12	4,253	Delaware, Lacka and Western railroad culvert ...	98.50
12	4,253	Canal bottom at railroad culvert	90.50
12	4,253	Water surface at railroad culvert..................	100.50
13	5,010	Water surface at Crystal Spring Creamery........	98.20
13	5,010	Water surface at Crystal Spring Creamery........	100.30
14	6,306	Highway culvert west of Crystal Spring Creamery	98.20 and 98.40
14	6,306	Canal bottom west of Crystal Spring Creamery ...	98.20 and 98.40
15	8,983	Canal bottom at aqueduct, Sing Sing creek........	96.60
15	8,983	Water surface at aqueduct in Canal creek.........	97.80
15	8,983	Water surface at aqueduct in Sing Sing creek.....	95.30
15	8,983	Bottom of Sing Sing creek at aqueduct	93.80

I made careful measurements of the amount of water discharging through the opening cut in the Fitch dam and through the easterly culvert (No. 10 in the table) of the Delaware, Lackawanna and Western railroad with the following result:

Amount discharged through Fitch dam, four and sixty-six hundredths cubits per minute.

Amount discharged through railroad culvert, four and twenty-nine hundredths cubits per minute.

Ninety-two per cent of the flow of water in this portion of the canal passes through the railroad culvert leaving but eight per cent which is fed into the canal between the Fitch dam and the railroad culvert. After a careful examination of the land adjoining the canal, between the summit at George Wells and Hulett avenue, near Horseheads, I found but three small ditches entering the canal and located as follows:

On the berme side, 182 feet west of G. Marriott's east line.

On the berme side, 204 feet west of G. Marriott's east line.

On the towing-path side, 548 feet east of Fitch dam on Sanders' land.

The State canal map shows no streams intercepted by the canal between the summit and Horseheads. The surface drainage here can not enter the canal from the towing-path side owing to the railroad embankment.

On the berme side the land slopes from the canal.

Obligations of the State and others to abate the nuisance.

The State.

The abandoned canal lands between the town line and the summit, with one exception, are owned by the State, there being but one release, that of Lewis Fitch No. 318, located just east of the summit. The lands of Messrs. Sayres and Murphy are not adjacent to the canal. Mr. Hulett's land is adjacent to the canal but he has given no release.

The Erie Railroad Company.

This company should be compelled to remove their culvert, which now discharges into the canal at the Fitch west line, and carry the drainage from its road-bed westerly across the summit into the canal near the Crystal Spring Creamery, where no damage would be done.

The Delaware, Lackawanna and Western railroad.

This railroad crosses the canal (see preceding table and nuisance map accompanying this report) in two places on lands not released, and should be compelled to prevent the overflow of Sing Sing creek across its road-bed into the canal prism and also to do all work necessary, as per the following proposed plan for abating the nuisance.

Proposed plan for abating the nuisance.

I have considered two plans for abating the nuisance, but have adopted the one which is the least expensive and which, in my opinion, will be all that is required for a proper drainage of the canal.

First plan.— To rebuild the State dam at the lands of Lewis Fitch, filling up the canal to a height sufficient to give a bottom grade so as to cause all water to flow over the summit. This plan would necessitate the rebuilding of the two railroad and one highway culvert, and would be expensive and difficult.

Second plan.— The one recommended is to cut off the discharge through the Delaware, Lackawanna and Western railroad's easterly culvert on the west end, by means of a masonry wall and small amount of embankment, and cause the discharge from the many springs in the canal prism (this discharge I found to be, as stated before, ninety-two per cent of the total water passing through the Fitch dam) to flow over the summit to Sing Sing creek, and the Erie railroad culvert to be removed at the company's expense. The balance (eight per cent) of the water flowing through the Fitch dam would lead through the gravelly soil and do no damage at Horseheads.

Estimated cost of abating the nuisance existing on the feeder from the dam on the lands of Lewis Fitch to the summit highway bridge:

Quantities.	ITEMS.	Amounts.	Price.
1	Bailing and draining	$25 00	$25 00
2	Repairs to highway and railroad culverts	20 00	40 00
10	Cubic yards earth excavation	30	3 00
2	Cubic yards excavation old masonry	1 00	2 00
2	Cubic yards rubble masonry in cement	6 00	12 00
	Total	....	$82 00

Nuisance No. 2.

Low's pond, on the lands of Cornelius Low, east of the village of Big Flats.

There is a large pond located here; it is fed by springs; it sets the water back to the westward in the canal prism for some distance and the water in this portion of the flooded canal, which extends in front of Mr. Low's house, at certain times of the year, becomes stagnant. There is no chance to drain this pond into the aqueduct to the eastward on account of the Delaware, Lackawanna and Western embankment, which crosses the canal just east of the pond, there being no culvert through the embankment; also on account of the culvert through the highway which crosses the canal 450 feet east of the pond and for the reason that the entire canal-bed, to the eastward, from the pond to Sing Sing creek, a distance of 1,770 feet, is from four and one-half to six feet higher than the low points in the pond.

Between the railroad and highway embankments there is a body of stagnant water which can not be drained, owing to said embankments and the high bottom of the canal.

The State canal map shows wide water where this pond is located, and, on the towing-path side, the ground is swampy and lower than the bottom of the pond.

Obligations of the State and others to abate the nuisance.

The State.

The abandoned canal lands upon which this nuisance is located belong to the State. Cornelius Low has given no release.

The Delaware, Lackawanna and Western Railroad Company.

This company crosses the canal east of the pond and should be compelled either to fill the canal between its embankment and the highway, or to build a culvert through its embankment and drain the water into Low's pond. The water held back by the railroad embankment was found to be six inches higher than that in Low's pond. (See accompanying nuisance map and profile.)

In all cases where railroad companies cross or occupy canal lands, not released, I have been unable to find any permits on record giving them this privilege.

Proposed plan for abating the nuisance existing at Low's pond, on the lands of Cornelius Low, east of Big Flats.

I would recommend that the Delaware, Lackawanna and Western Railroad Company place a culvert through their road-bed, so as to drain the basin east of its road-bed into Low's pond, and that the State cut an opening through the towing path, as shown and located on the nuisance map, low enough to drain the entire bottom surface of the pond, allowing the water to run out and waste over the swampy land on the towing-path side of the canal, as the land adjacent to the canal, next to the tow-path embankment, is an original swamp; there is, in my opinion, a doubt as to whether any obligation rests upon the State to further dispose of this water otherwise than to restore it to the original swamp.

I have, however, taken levels and platted a profile on the map for the purpose of connecting the pond discharge by a ditch cut along the north side of the railroad, with a culvert under the railroad about 2,950 feet westerly from Low's pond. I do not think it will be necessary to cut this ditch. If it should be found necessary to do so, the whole excavation would be in soft earth and would amount to 1,100 cubic yards. The right to occupy the land for this purpose would be given free of cost by the land owner, Mr. Jerry Rhodes.

It would be well to make the cut through the towing-path bank, as located on the plan, as this will be the best location in case a connection is needed, by means of a ditch, with the railroad culvert 2,950 feet to the westward of the pond.

Table showing elevation of culverts, canals, etc., at and in connection with the nuisance at Low's pond:

Distance in feet from pond.	DESCRIPTION.	Elevation.
0	Water surface in Low's pond	98.60
0	Bottom of Low's pond	93.60
0	Top of Delaware, Lackawanna and Western Railroad Company's embankment	106.50
60 east	Water surface in basin between railroad and highway embankment	99.10
60 east	Bottom of basin between railroad and highway embankment	98.10
578 east	Bottom of culvert through highway embankment	99.80
578 east	Top of highway embankment	114.90
657 east	Canal bottom	98.60
1,158 east	Canal bottom	98.10
1,613 east	Canal bottom at aqueduct, Sing Sing creek	97.80
1,613 east	Water surface Sing Sing creek at aqueduct	95.30
0.0	Surface of low ground, towing-path side of canal	91.0 to 92.0
1,300 west	Canal bottom west of pond	97.80 to 98.10
2,950	Bottom of railroad culvert for ditch connection	89.10

Estimated cost for draining Low's pond, east of the village of Big Flats — ditch connecting with railroad culvert not included:

Quantities.	ITEMS.	Price.	Amount.
1	Bailing and draining	$10 00	$10 00
2,000	Cubic yards excavation	20	400 00
	Total		$410 00

Nuisance No. 3.

On the lands of N. S. Mundy, Henry Botshire, W. B. Miller and others, in the town of Big Flats.

Several years after the completion of the Chemung canal feeder the State dug ditches on the lands of N. S. Mundy and others to catch the leakage from the canal prism and conduct said leakage to Gardner's creek, at a point about 7,000 feet southward from the canal. The main ditch, first dug eastward nearly parallel to the canal for a distance of 2,524 feet and then turning southward, ran for a distance of 4,100 feet and emptied into Gardner's creek near the highway. Some time after the construction of the canal feeder the State constructed a spillway (constructed of timber, I am informed), in the towing-path bank adjoining the lands of N. S. Mundy and dug a ditch from it to the main ditch at a distance of 2,679 feet southward from the canal.

Several farm bridges were built by the State over this ditch for the use of the adjoining land owners.

Several times since these ditches were dug the State has expended money for opening and cleaning them and rebuilding the bridge crossings.

Since the abandonment of the Chemung canal feeder the waste-weir has disappeared, leaving an opening in the towing-path bank, through which at times the water from the prism flows in a great volume from the westward, for a long distance cutting away the canal banks, filling the channel of the ditch and causing the water to overflow Mr. Mundy's land. Mr. Mundy has attempted to prevent this by filling the washout in the canal and the opening in the bank with loose stone, but, as the ends of the opening are unprotected, the attempt was a failure.

Most of the bridges are gone and the channel of the main ditch from end to end is filled with bars.

A large amount of water at times come from the westward on the land of Haight, Gillette and Goff, which will be described later under the heading of nuisance No. 4, and would be done away with here if that nuisance were abated.

Obligations of the State and others to abate the nuisance.

I am of the opinion that the State alone is liable for abating this nuisance.

The State canal map shows but one stream, Mundy's creek, just west of the old waste-weir, intercepted by the canal.

There are but two parcels of released canal lands, situated just west of N. S. Mundy's land, between the old waste-weir and nuisance No. 4. The first is D. R. Denning, release No. 273, the second, Mary Denning, No. 275 — both are on the berme side of the canal.

Mr. Mundy informs me that he has never claimed any damages from the State for lands damaged by overflow, nor has he received any payment for lands appropriated for the ditches. I have been informed that no payments have been made to other property owners on the line of the ditch.

Proposed plan for abating the nuisance on the lands of N. S. Mundy and others in the town of Big Flats.

I would recommend that the ditch extending from the canal to the main ditch, and also the main ditch extending from Mundy's pond and lane to Gardner's creek, be excavated to the grades shown on the accompanying nuisance map, having a bottom width of eight feet with side slopes of one and one-half to one. The timber and plank bridges, resting on wooden sills instead of masonry, be placed at the following places:

At stations 4679 and 6358 on the ditch from the canal to the main ditch on the lands of N. S. Mundy.

And one on W. B. Miller's land on the main ditch near Gardner's creek.

Also, that there be a stone waste-weir built in the opening in the canal bank. The structure to have a timber and plank foundation, and the foundation on the down-stream side to be extended to serve as an apron to the overflow. There should be a sloping fill of loose stone extending from the top of the spillway to the apron to break the fall of the water.

The ends of the waste-weir to be protected by wing walls which will form a protection to the canal bank.

The following table shows elevations of the ditches, canal and other points connected with this proposed plan:

Station O is at junction of main ditch and Gardner's creek.

Distance from waste-weir on canal, in feet.	DESCRIPTION.	Present elevation.	Proposed elevation.
148	Canal bottom, 148 feet east of spillway	122.90	....
180	Canal bottom, 180 feet west	122.90	....
0	Lowest point in washout in canal	114.80	....
90	Bottom of ditch near canal	113.80	....
194	Bottom of ditch, Sta. 6585, canal to main ditch	112.30	112.00
2,619	Bottom of ditch, Sta. 4100, junction to ditches	101.00	100.00
5,111	Bottom of main ditch at Mundy's pond, Sta. 6592	100.30	101.00
3,950	Bottom of main ditch, Sta. 2829	97.90	97 00
6,779	Bottom of main ditch, Sta. Gardner's creek, Sta. O	95.40	94.00
6,779	Water surface Gardner's creek, Sta. O	93.80	....
0	Top of wings of new spillway on towpath	....	127 00
0	Top of spill of new spillway	....	122.00
0	Top of foundation plank spillway	....	114.00

Estimate for abating the nuisance on the lands on N. S. Mundy and others in the town of Big Flats:

Quantities.	ITEMS.	Price.	Amounts.
3,000	Cubic yards earth excavation	$0 20	$600 00
500	Cubic yards embankment	20	100 00
148	Cubic yards rubble masonry in cement	6 00	888 00
5	Cubic yards twist wall, dry	3 00	15 00
6,500	Ft. B. M. hemlock timber and plank	18 00	117 00
1,200	Ft. B. M. pine timber and plank	35 00	42 00
....	Spikes and nails	....	15 00
	Total	....	$1,777 00

Nuisance No. 4.

On the lands of Haight, Goff and Gillette, opposite the East Corning railroad depot.

During certain seasons of the year a large amount of water flows into this portion of the canal by means of ditches leading from the high ground on the northerly side. As the grade of the canal is now found, this water, at the ordinary stage, should flow to the westward and empty into Bloody Run creek, near Stephen Gorton's land (release No. 329) or through the waste-weir on William Gorton's land (release No. 332). This is prevented by low spots in the canal prism, by many bars at the mouths of the ditches, by a lane crossing the canal, without a culvert, built by Haight, by the highway crossing the canal just east of Sherman Seymour's (release No. 327), where no culvert through the embankment could be found, although one is said to exist there, and two crossings, without culverts, by the Delaware, Lackawanna and Western railroad — the one on Smith's land, the other on Stephen Gorton's (release No. 329).

In times of flood the water is backed up by the Haight lane crossing and by the highway spoken of and turned eastward until it reaches Mundy's ditch, a distance of 9,600 feet, where it helps maintain an existing nuisance. In times of low water the bars and low places form pools which become stagnant.

Liability of the State and others to abate the nuisance.

The State.

There are no streams shown on the State canal map which are cut off by the canal that would have any effect on this portion of the canal.

About one-half of the canal lands, upon which this nuisance exists, belong to the State, the balance belong to W. M. Gillette (release No. 630) and William Goff (release No. 328).

The heaviest bars exist on the lands of the State.

Obligations of others.

Wm. Goff has released the State, a portion of the bars exist on his land; he should pay his proportion of the cost of abating the nuisance.

Wm. Gillette has also released the State; most of the low places are on his land; he should also pay his share of the expense.

S. D. Haight has not only built his lane across the canal, blocking the flow of water, but has also changed the course of a ditch which formerly emptied into the canal on his land, so that it now enters the prism of the canal from the land of Goff Bros. and forms the largest and most damaging bar on this portion of the canal; he should be compelled to place a culvert through his lane where it crosses the canal, and to change the course of the ditch.

The town of Big Flats.

The town should provide for drainage through its highway embankment, towards Bloody Run creek, by opening the culvert, if one exists there, or by constructing a new one.

The Delaware, Lackawanna and Western Railroad Company.

This company should also provide for drainage towards Bloody Run creek by means of culverts through its embankment at the canal crossing, located on the lands of Smith and Gorton.

An inspection of the map and profile accompanying this report will show the elevations of the canal and obstructions.

Proposed plan for abating the nuisance on the lands of Haight, Gillette and Goff, opposite the East Corning depot.

I would recommend that the prism of the canal be excavated and filled to the grade shown on the profile on the nuisance map, beginning on Wm. Goff's land, 250 feet east of the highway with an elevation of 95.30, and ending 350 feet west of Haight's land with an elevation of 93.10. The total distance being 2,160 feet. Also, that culverts be constructed in the highway and railroad embankments, as previously described, in order to permit the drainage toward Bloody Run creek.

Estimated cost of removing bars and filling the prism of the canal for abating the nuisance on the lands of Haight, Gillette and Goff, opposite the East Corning depot:

Quantities.	ITEMS.	Price.	Amount.
150	Cubic yards earth excavation	$0 20	$30 00
680	Cubic yards embankment	15	102 00
	Total	....	$132 00

Summary estimates for abating nuisances on the Chemung canal and Chemung canal feeder:

Summary No. 1.

Dividing expense with Elmira, Cortland and Northern Railroad Company — on nuisance No. 1, Chemung canal.

Number of nuisances.	LOCATION.	Amount.
1	Lock No. 48, to Grand Central avenue and Diven's ditch	$4,822 00
2	Junction at Horseheads to Pine Valley	4,177 00
3	Between lock 35 and Hubbard Run creek	195 00
4	Lock 26, Millport	80 00
5	Havana level culvert, between locks 1 and 2	150 00
6	Mill creek and lock No. 1, Havana	797 00
	Chemung canal total	$10,221 00

Summary No. 2.—Chemung canal.

Total cost, including culvert work and canal filling on nuisance No. 1, Chemung canal:

Lock No. 48, to Grand Central avenue and Diven's ditch	**$7,308 00**
Junction at Horseheads to Pine Valley	**4,177 00**
Between lock No. 26, Millport	**195 00**
Lock No. 26, Millport	**80 00**
Havana level culvert, between lock No. 1 and No. 2,	**150 00**
Mill creek and lock No. 1, Havana	**797 00**
Total on Chemung canal	**$12,707 00**

Summary No. 3.— Chemung canal feeder.

From Fitch's dam to the summit highway bridge..	**$82 00**
Low's pond	**410 00**
On lands of N. S. Mundy and others	**1,777 00**
On lands of Haight, Goff and Gillette	**132 00**
Total on feeder	**$2,401 00**

Total of summary No. 1 and No. 3, $12,622.

Total of summary No. 2 and No. 3, $15,108.

Twenty per cent should be added to above estimate to cover cost of contingencies and supervision.

The field work of the survey began in August, 1892, and ended in November of the same year.

The entire season was a dry one for this locality and water channels which, in the spring and fall, are generally well filled were, for the most part, empty.

JOHN R. KALEY,
Engineer in Charge.

INDEX.

A. PAGE.

Abutments of bridges, eastern division 67, 73
Abutments of bridges, middle division 107
Albany basin 19
Aqueducts 11, 65, 72, 107, 111, 241
Aqueducts across Mohawk river and Schoharie creek 11

B.

Baldwinsville dam 110
Banks of canal, eastern division 63, 70
Basin at Albany 19
Battle island dam 110
Beaver river, Stillwater 103
Bench marks on middle division 224–230
Board of Claims survey 22, 102, 104
Boundary line between Erie and Genesee counties 29
Bradley brook reservoir 104
Breaches or breaks on eastern division 70, 74, 100
Bridges on eastern division 67, 70
Bridges on middle division 104, 105, 106, 109, 111
Bridges on western division, description 241–243
Bridges on western division, list of 252–258
Bridge, lift, at Water street, Albany 22, 69
Bridge, lift, at Nineteenth street, West Troy 69
Bridge at Camillus 105
Bridge at Carthage 111
Bridge at Castorland 111
Bridge at DePuyster street, Rome 102
Bridge at Forestport feeder 111
Bridge at Genesee street, Utica 102
Bridge at Illingsworth 111
Bridge at Madison street, Rome 103
Bridge at North Carolina street, Syracuse 103
Bridge at North Lake spillway 111
Bridge at Schuyler street, Utica 102
Bridge at Whittlesey's 111
Bridges, over canals 17
Bridges, highway, inspection of 28
Buffalo harbor 18
Bulkheads 104, 105, 107, 244

C.

PAGE.

Camillus feeder 105
Canal, Black River, locks on 15
Canal, Champlain, improvement recommended 9
Canals, cost of 6–38
Canals, cost of, table of 46, 47
Canal, enlargement 8
Canal, Erie, improvements recommended 9
Canals, general remarks concerning 5
Canal, proposed ship 24
Canals, total cost of. Erie and Champlain 47
Canals, total cost of. Oswego 48
Canals, total cost of. Black River 49
Canals, total cost of. Cayuga and Seneca 50
Canals, total cost of. Oneida Lake 51
Canals, total cost of. Seneca River towing path 52
Canals, total cost of. Crooked Lake 53
Canals, total cost of. Chenango 54
Canals, total cost of. Chemung 55
Canals, total cost of. Genesee Valley 56
Capitol, hospitals, etc., engineering work at 32
Carthage bridge 111
Castorland bridge 111
Cayuga inlet, dredging 104
Cayuga and Seneca canal 110
Cement testing 18
Centerport aqueduct 107
Channel between Shinnecock and Peconic bays 26, 75
Chemung canal, survey of 22
Chittenango aqueduct 104
Columbian exposition, proposed exhibition at 32
Contracts completed and settled for, table of 44
Contracts pending, table of 45
Contracts completed, eastern division 90
Contracts pending, eastern division 91
Contracts completed, middle division 132
Contracts pending, middle division 133
Crane Brook aqueduct 104, 107
Culverts on eastern division 64, 72
Culverts on middle division 105, 108, 112
Culverts on western division 243
Culverts, West Utica 103

D.

Dam at Allen's creek 238
Dam at Baldwinsville 16
Dam at Beaver river, Stillwater 100
Dam at Bush's 112
Dam at Cohoes and Troy 15
Dam at Forestport 13, 14, 102
Dam at Genesee river, Rochester 238

PAGE.
Dam at Lansingkill.... 112
Dam at Little Falls 13, 14, 69
Dam at Medina 238
Dam at Oil creek, No. 1.... 238
Dam at Oil creek, No. 2.... 238
Dam at Otter creek.... 112
Dam at Stillwater.... 13, 14
Dam at Tonawanda creek 238
Description of eastern division 61
Description of middle division 96
Description of western division 237
De Puyster street bridge, Rome.... 102
Ditches to carry off leakage.... 10
Ditching and draining 101
Docks of canal, eastern division 63
Docks of canal, middle division 108–110
Dredging Cayuga inlet.... 104
Dugway trestle 69

E.

Eaton Brook reservoir 104
Electricity as a canal motive power.... 23
Embankment at Mad Brook, Sherburne 104
Employes on eastern division 77–89
Engineering expenses, table of.... 41
Engineering on eastern division 77–89
Engineering on middle division 115
Engineering on middle division, table showing rank, etc.... 116–130
Engineering on middle division, summary 131
Engineering on western division, table showing rank, etc 246–251
Engineering on western division, summary. 251
Erie canal improvements recommended.... 8

F.

Feeders on middle division.... 108
Final accounts 44
Forestport dam 102
Forestport reservoir 100
Fulton dam.... 105

G.

Genesee street bridge, Utica.... 102

H.

Harbor at Buffalo 18
High dam.... 105
Hospitals, Capitol, etc., engineering at.... 32
Hudson river improvement.... 26, 259–271

I. PAGE.

Illingsworth bridge 111
Inspection of iron highway bridges 28

K.

Kingsley brook reservoir 104

L.

Land office 30
Lansingkill aqueduct 104
Lift-bridge, Nineteenth street, West Troy 69
Lift-bridge, Water street 69
Limestone aqueduct 107
Little Falls dam 69
Locks on eastern division 69–71
Locks on middle division 105, 106, 110, 112
Locks on western division 238, 239
Locks on Black River canal 11
Lock lengthening 15

M.

Mad brook 106
Madison street bridge 105
Medina aqueduct 24
Mileage, total on eastern division navigable 62
Mileage, total on eastern division not navigable 62
Mileage, total on middle division navigable 95, 214
Mileage, total on middle division feeders navigable 95, 214
Mileage, total on middle division feeders not navigable 95
Mileage, total on western division navigable 237
Mileage, total on western division not navigable 237
Mohawk aqueduct 106
Moyer creek repairs 68
Mud Lock bridge 109
Municipal Consolidation Commission 32

N.

Navigation on middle division 99
Niagara Falls reservation 31
North Carolina street bridge, Syracuse 103
North Lake spillway bridge 111

O.

Organization of the department 40
Oriskany aqueduct 104, 107
Oswego canal 109
Oswego canal improvement recommended 9
Oswego dam 110
Oswego wall 100

P. PAGE.

Palmyra aqueduct 241
Port Byron aqueduct 109
Prisms of canal on eastern division 65
Prisms of canal on middle division 112

Q.

Quarantine establishment 53

R.

Recommendations requiring special appropriations 113
Report on canals, eastern division 59
Report on canals, middle division 95
Report on canals, western division 235
Report on condition of abandoned Chemung canal and feeder, 277–322
Report on Hudson river improvement 259–275
Reservoir at Beaver river 113
Reservoir at Bradley brook 104, 109
Reservoir at Eaton brook 104, 109
Reservoir at Forestport 103
Reservoir at Hatch's lake 109
Reservoir at Jamesville 109
Reservoir at Kingsley brook 104, 109
Reservoir at Madison brook 109
Reservoir at North lake 113
Reservoir at Woodhull 115
Road improvement 39
Rome wall 103

S.

Sauquoit aqueduct 104
Saranac river improvement 31
Schenectady wall 9
Schuyler street bridge, Utica 102
Sections, list showing location on eastern division 61
Seneca river aqueduct 107
Ship canal, proposed 24
Shinnecock channel 26
Sluiceways 72–74
Special survey, Board of Claims 102–104
Special survey, Black River canal 102
Special survey, De Puyster street bridge, Rome 102
Special survey, Erie canal, city of Rome 103
Special survey, Forestport dam 101
Special survey, Genesee street bridge, Utica 102
Special survey, Schuyler street bridge, Utica 102
Spillways 106–110
Spillways at Amos mills, Syracuse 109
Spillways at Haskins' mills 110
State survey 34

PAGE.
Structures, location of, on Black River canal 188–213
Structures, location of, on Cayuga and Seneca canal 182–187
Structures, location of, on middle division 138–169
Structures, location of, on Oswego canal................... 170–181
Structures, location of, summary of, on middle division...... 214–220
Summary of total cost of canals 57
Survey of Board of Claims 22–102
Survey of Chemung canal.......................... 22, 277–322

W.
Wall in the city of Schenectady................................ 72
Wall in the city of Oswego.................................... 103
Wall in the city of Rome....................................... 103
Wall over sluiceway, Glens Falls feeder........................ 74
Waste-water... 65
Waste-weirs 65, 72, 74, 104, 157, 244
Water record, Cayuga and Cross lakes and Seneca river..... 134–137
Water supply.............................. 13, 62, 97, 100, 237